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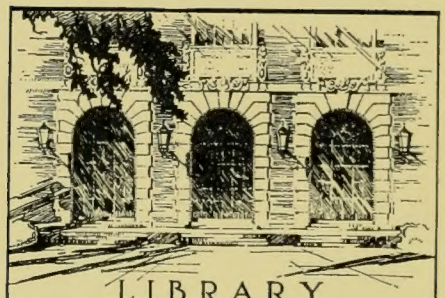

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NATURAL HISTORY
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STATE OF ILLINOIS
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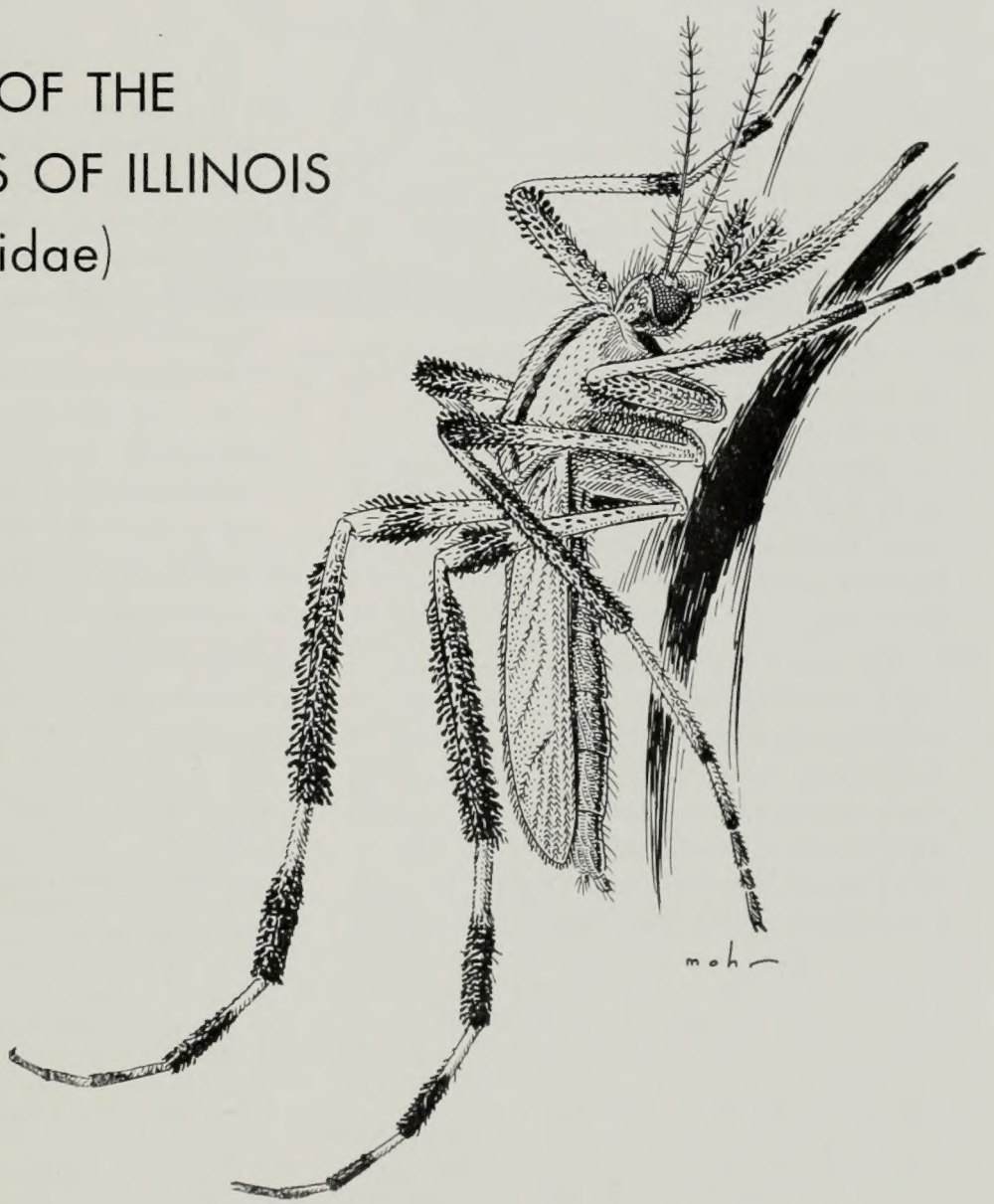
A SYNOPSIS OF THE MOSQUITOES OF ILLINOIS (Diptera, Culicidae)

Herbert H. Ross
William R. Horsfall



Illinois Natural History Survey
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COVER DRAWING.—One of the largest Illinois mosquitoes is the "gallinipper," *Psorophora ciliata*, which may attain a wingspread of 15 mm (over half an inch). It is a vicious biter and is widely distributed over Illinois. The larvae or wrigglers of this species breed in rain pools and have the habit of feeding on larvae of other mosquito species.

A SYNOPSIS OF THE MOSQUITOES OF ILLINOIS

(Diptera, Culicidae)

Herbert H. Ross
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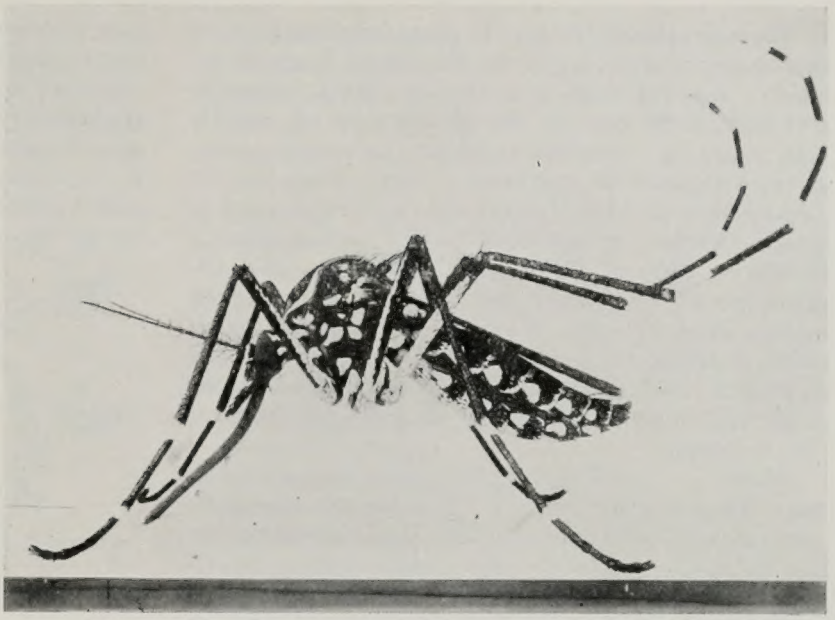


FIG. 1.—Adult of *Aedes aegypti*. (From photograph, lent by the U. S. Public Health Service, of model in the American Museum of Natural History.)

TO ALL OF US WHO LIVE IN ILLINOIS, mosquitoes are familiar as pests that attack persons and livestock out of doors from spring to fall.

They may be of greater consequence than simply as biting pests. Some kinds are solely responsible for transmitting certain parasites to man and domestic animals. Blood parasites such as those that cause malaria, yellow fever, dengue, and filariasis must have mosquitoes to take them from sick to well persons. Several of the encephalitis-producing ultramicroscopic viruses that attack the brain and spinal cord are carried solely by mosquitoes from wild animals to man or from man to man. Past control efforts against mosquitoes have reduced some of these diseases to insignificance. Other diseases carried by mosquitoes still rise at times to plague us.

To date, mosquitoes of 55 different species have been taken in Illinois. Seven additional species, known in neighboring states from situations similar to those in this state, may also occur in Illinois and are included in this synopsis. These 62 species, along with several hundred more in other parts of the world, constitute the family Culicidae. This family and a hundred or more additional families of two-winged flies together comprise the order Diptera.

The Illinois species of mosquitoes differ from each other in the habitats they frequent and in many details of their life histories. All of them, however, have many characters and habits in common. The immature form or larva (known as a wriggler) is aquatic, that is, it lives in water. This form requires several to many days to become a full-grown larva. At this time, it transforms into the next life history stage, the pupal (as pupae, mosquitoes are called tumblers), and this stage also is aquatic. The pupal stage, which lasts only a few days, is a transformation stage; within the pupa the tissues of the larva are transformed into those of the adult mosquito. When the transformation is complete, the pupa floats at the surface of the water, its shell cracks and breaks the surface film, and the winged adult emerges.

Adult mosquitoes (Fig. 1) are entirely aerial and never enter the water. After a period of feeding and mating, the females lay eggs either on the surface of the water or in soil that will be flooded at a later date. Eggs laid on the water hatch in a few days; each small larva emerges directly into the water from the end of the egg that sticks into it. Eggs laid in soil hatch when the soil is flooded and the eggs are covered by the right kind of water.

This synopsis provides means for identifying the mosquitoes likely to be found in Illinois. It contains keys to eggs, larvae, and adults, because the sanitarian, ecologist, and collector working with mosquitoes will find all stages of the insects and may not have the time or means to rear the insects to other stages. It is an extension of the original report, *The Mosquitoes of Illinois* (Ross 1947) in that it includes more species and presents a key to eggs of floodwater mosquitoes. Most of the keys in this synopsis have been enlarged from the original report; some of the illustrations are from the original report and some are new.

This paper is printed by authority of the State of Illinois, IRS Ch. 127, Par. 58.22. It is a contribution from the Section of Faunistic Surveys and Insect Identification of the Illinois Natural History Survey. Dr. Ross is head of that section. Dr. Horsfall is a Professor of Entomology, Department of Entomology, University of Illinois.

The authors wish to express special thanks to James S. Ayars, the Survey's Technical Editor, for the creative way in which he has contributed to the production of this *Synopsis*. His unstinting and understanding help in simplifying terminology, rephrasing couplets, and clarifying concepts has made this publication useful to a much wider circle.

For convenience, the keys to genera and species have been arranged according to the life history stages of the insects. A person wishing to identify a female mosquito will find all the keys for the identification of females, both to genera and to species within the various genera, grouped together in the same section. Keys for the identification of males, larvae, and eggs are grouped in similar fashion. At the head of each section there is included a diagram of the stage concerned. The diagrams are labeled to show the diagnostic areas or parts mentioned in the keys. If only one species of a genus occurs in Illinois, it is indicated and treated in the keys to genera. Each of the other species is treated in one of the keys to genera; these keys are arranged alphabetically by genera.

Names of certain genera and species may appear in more than one place in a key. This practice allows the use of a large number of characters for recognizing certain distinctive groups of species within a genus or certain distinctive variations within a species.

The cardinal directions used for orienting parts of the mosquito body or appendages are as follows:

apex—The portion away from the point of attachment; concerning the abdomen or its segments, the part more distant from the head.

apical—On or pertaining to the apex.

base—The portion at the point of attachment; in relation to the abdomen or its segments, the part nearer the head.

basal—On or pertaining to the base.

anterior—Forward, toward the head, or in front of.

posterior—Backward, toward the rear, or back of.

dorsum—The upper part or back.

dorsal—On or pertaining to the dorsum.

dorsally—In the direction of the dorsum.

lateral—On or pertaining to the sides.

laterally—In the direction of the sides.

meson—The midline down the length of the animal.

mesal—On or pertaining to the meson.

venter—The under part or belly.

ventral—On or pertaining to the venter.

In the keys, the singular rather than the plural form is ordinarily used to designate the diagnostic parts of which the mosquito has only one on a side, as, for example, hind femur, eye, antenna, costa.

Information concerning distribution and habitat is included in the keys. A summary of the distribution of each species is given in the keys to females; information concerning the habitats of the larvae is given in the keys to larvae; and the place of deposition of the eggs is given in the keys to eggs. If the name of a species appears in more than one place in a key, summary information is included in the place where the largest numbers of the species will fit.

DIAGNOSIS OF MOSQUITOES

An adult of the family Culicidae (Fig. 1), to which the mosquitoes belong, can be differentiated from other two-winged flies by the following characters: (1) an elongate proboscis many times as long as the head, (2) antennae which are much longer than the head and are composed of many small, well-separated segments, many segments each with a ring of hairs, and (3) wings with an arrangement of veins depicted in Fig. 6. A pupa is characterized by being active in water, by having a curled posture, and by having a pair of respiratory tubes on the dorsum of the thorax (Fig. 2). The pupae are

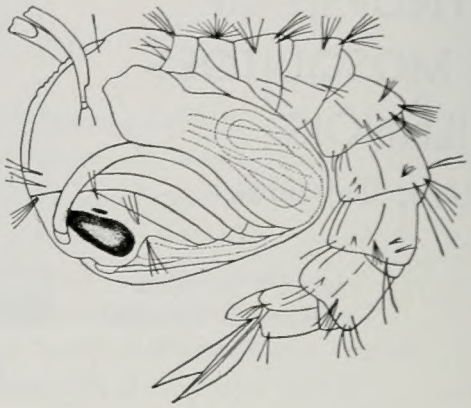


FIG. 2.—Pupa of mosquito. The two respiratory tubes are visible in the upper left part of drawing. (After King, Bradley, & McNeel 1939.)

not diagnosed in this report. A larva of the Culicidae can be differentiated from other aquatic, free-swimming insect larvae by the following combination of characters: (1) legs absent; (2) head large and possessing a hard covering; (3) thorax large and wider than the abdomen; (4) the respiratory system opening dorsally on the next-to-last segment of the abdomen; (5) four blade-like "gills" extending posteriorly from end of last abdominal segment (Fig. 125, 126). In many species, the larva has a long or stout, usually hard and dark, air tube (Fig. 125). Eggs of mosquitoes are black or gray in color, sausage-like or spindle-like in shape, and each not more than 1 mm long.

Members of the family Culicidae are frequently confused with midges of the closely related family Chaoboridae. In the Chaoboridae, no adult has a proboscis and neither male nor female bites. In the Culicidae, the adult has a proboscis; the male does not bite but sucks up nectar and free water; the female sucks either juices of plants or blood of vertebrates through a group of fine, slender stylets housed within the proboscis. The adults and larvae of these two families can be recognized by use of the following keys.

KEY TO CULICIDAE AND CHAOBORIDAE

Adults (Both Sexes)

Head having an elongate proboscis (Fig. 1, 6) many times as long as diameter of head.....**Culicidae**

Head with no proboscis, mouthparts forming only short fleshy lobes that are no longer than depth of head... ..... **Chaoboridae**

Larvae

1. Antennae arising close together on a mesal raised area or protuberance of the head (Fig. 3)..... ..... **Chaoboridae**

   Antennae arising far apart at sides of head (Fig. 125, 126) 2

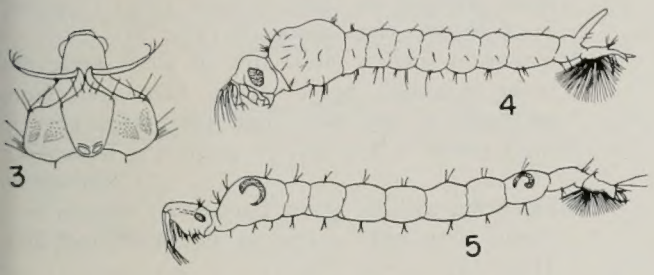


FIG. 3.—Head of larva of *Corethrella.*

FIG. 4.—Larva of *Mochlonyx cinctipes.* (Redrawn from Matheson 1944.)

FIG. 5.—Larva of *Chaoborus punctipennis.* (Redrawn from Matheson 1944.)

2. Last segment of abdomen with sclerotized ring or plate at least dorsally (Fig. 126, 127); apical or subapical hairs of antenna slender and less than half length of antenna .....**Culicidae**

   Last segment of abdomen without a sclerotized ring or plate; apical and subapical hairs of antenna very stout and at least half length of antenna (Fig. 4, 5) .....**Chaoboridae**

LIST OF INCLUDED SPECIES

Species having names below in **boldface type** are known to occur in Illinois; species having names in *italic type* are known from neighboring states but not yet from Illinois.

Aedes abserratus (Felt & Young)
aegypti (Linnaeus)
atlanticus Dyar & Knab*
atropalpus (Coquillett)
aurifer (Coquillett)
campestris Dyar & Knab
canadensis (Theobald)
cinereus Meigen
communis (De Geer)
dorsalis (Meigen)
dupreei (Coquillett)
excrucians (Walker)
fitchi (Felt & Young)
flavescens (Mueller)
fulvus pallens E. S. Ross
grossbecki Dyar & Knab
hendersoni Cockerell
infirmatus Dyar & Knab
mitchellae (Dyar)
nigromaculis (Ludlow)
punctor (Kirby)
sollicitans (Walker)
spenceri (Theobald)
sticticus (Meigen)
stimulans (Walker)
thibaulti Dyar & Knab
tormentor Dyar & Knab
trichurus (Dyar)
triseriatus (Say)
trivittatus (Coquillett)
vexans (Meigen)
Anopheles barberi Coquillett
crucians Wiedemann
earlei (Vargas)
punctipennis (Say)
quadrimaculatus Say
walkeri Theobald
Culex erraticus (Dyar & Knab)
peccator Dyar & Knab
pipiens Linnaeus
quinquefasciatus Say
restuans Theobald
salinarius Coquillett
tarsalis Coquillett
territans Walker
Culiseta inornata (Williston)
melanura (Coquillet)
minnesotae Barr
morsitans (Theobald)
Mansonia perturbans (Walker)
Orthopodomyia alba Baker
signifera (Coquillett)
Psorophora ciliata (Fabricius)
confinnis (Arribalzaga)
cyanescens (Coquillett)
discolor (Coquillett)
ferox (Humboldt)
horrida (Dyar & Knab)
howardi (Coquillett)
longipalpis Roth
varipes (Coquillett)
Toxorhynchites rutilus septentrionalis Dyar & Knab
Uranotaenia sapphirina (Osten Sacken)
Wyeomyia smithi (Coquillett)

* The Illinois record for this species has not been verified by larval or male specimens.

KEY TO SEXES OF CULICIDAE ADULTS

Tip of abdomen blunt or pointed and having only unsegmented lobes (the cerci) projecting from it (Fig. 6) .....**females**

Tip of abdomen having a complex set of genital parts, of which the most conspicuous is a pair of claspers, each clasper divided into two segments, the basistyle and the dististyle (Fig. 65, 68–72).....**males**

KEYS TO CULICIDAE FEMALES

The chief parts named in these keys are illustrated in Fig. 6; detailed characters are included in diagnostic drawings illustrating the couplets. Although this set of keys (especially the key to genera) will serve for the identification of most males, many collected and reared males have parts so shriveled, distorted, or rubbed that

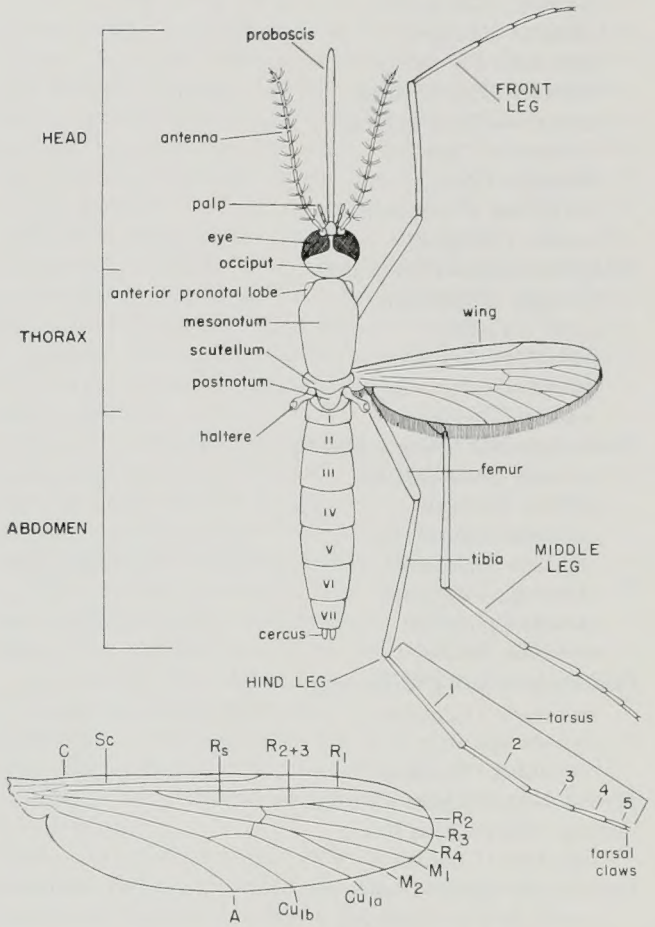


FIG. 6.—Diagram of adult female mosquito and the names given to various parts used in the keys. (Modified from Pratt & Barnes 1959.)

the minute characters on which the keys to females are based can be seen only with difficulty. In most instances, therefore, males are more dependably identified by means of that set of keys devoted to them.

Key to Genera of CULICIDAE (Females)

1. Vein R_{2+3} branching close to apical margin of wing, so that cell R_2 is only half the length of its stalk, R_{2+3} (Fig. 7) 2
   Vein R_{2+3} branching much farther from apical margin of wing, so that cell R_2 is at least as long as its stalk, R_{2+3} (Fig. 8) 3
2. Wing length 6.5 mm or more; thorax with stripes of bluish-green scales; proboscis curved downward abruptly just beyond midpoint into a quarter circle, palp very long and massive (Fig. 17). Sole Illinois representative, occurring in southern part of state ..... **Toxorhynchites rutilus septentrionalis**
   Wing length under 3.5 mm; sides of thorax with many small, highly iridescent blue scales; proboscis only slightly curved, palp short and abortive (Fig. 18). Sole Illinois representative, common throughout the state ..... **Uranotaenia sapphirina**
3. Mesoscutellum with posterior margin evenly rounded, the setae or hairs arranged evenly along it (Fig. 9); palp as long as proboscis (Fig. 21) ..... **Anopheles**
   Mesoscutellum with posterior margin incised to form a mesal lobe and 2 lateral lobes, with the setae grouped on these 3 lobes (Fig. 10); palp much shorter than proboscis (Fig. 20) 4
4. Mesonotum with a mesal line of short setae and scales bordered by a glossy bare area along each side of the mesal line (Fig. 11); apex of hind femur with a tuft of projecting hairs (Fig. 13) ..... **Psorophora**
   Mesonotum without glossy bare areas; apex of hind femur with only a few or no projecting hairs (Fig. 14) 5
5. Hind tarsus with 1 preapical or 2 apical segments entirely white, the remainder entirely blue or black ..... **Psorophora**
   Hind tarsus either with some segments ringed with white (Fig. 14), or all segments nearly the same color 6
6. Hind tarsus with wide or conspicuous bands of white on most segments (Fig. 14) 7
   Hind tarsus with no bands, or bands only faintly and indistinctly indicated 13
7. Second, third, and fourth tarsal segments of hind leg each with a narrow white band at each end (Fig. 14) 8
   Second, third, and fourth tarsal segments of hind leg each with a white band at base only (Fig. 31–33) 10
8. Proboscis black, with a definite white band in middle, as in Fig. 19 ..... **Culex tarsalis**
   Proboscis not banded; either all black, mottled, or black except for rows of white scales along its entire length (Fig. 20) 9
9. Mesonotum nearly black, but with a series of sharply contrasting white lines, as in Fig. 12 ..... **Orthopodomyia**
   Mesonotum either without white lines, with only pale lines, or generally light colored 17
10. Post-spiracular area of thorax entirely bare (Fig. 22); dorsum of thorax with many long, abundant, and erect hairs. Sole Illinois representative, widespread in state ..... **Mansonia perturbans**
    Post-spiracular area of thorax with bristles or a patch of scales (Fig. 23); dorsum of thorax with all hairs much more appressed 11
11. Outer face of hind femur in general dark but with a transverse band of white scales just before apex (Fig. 16) ..... **Psorophora confinnis**
    Outer face of hind femur without such band 12
12. Wing having either costa banded with white-scaled areas and black-scaled areas, or anal vein white-scaled for basal two-thirds and apical portion black-scaled ..... **Psorophora**
    Wing either almost uniformly white- or dark-scaled,

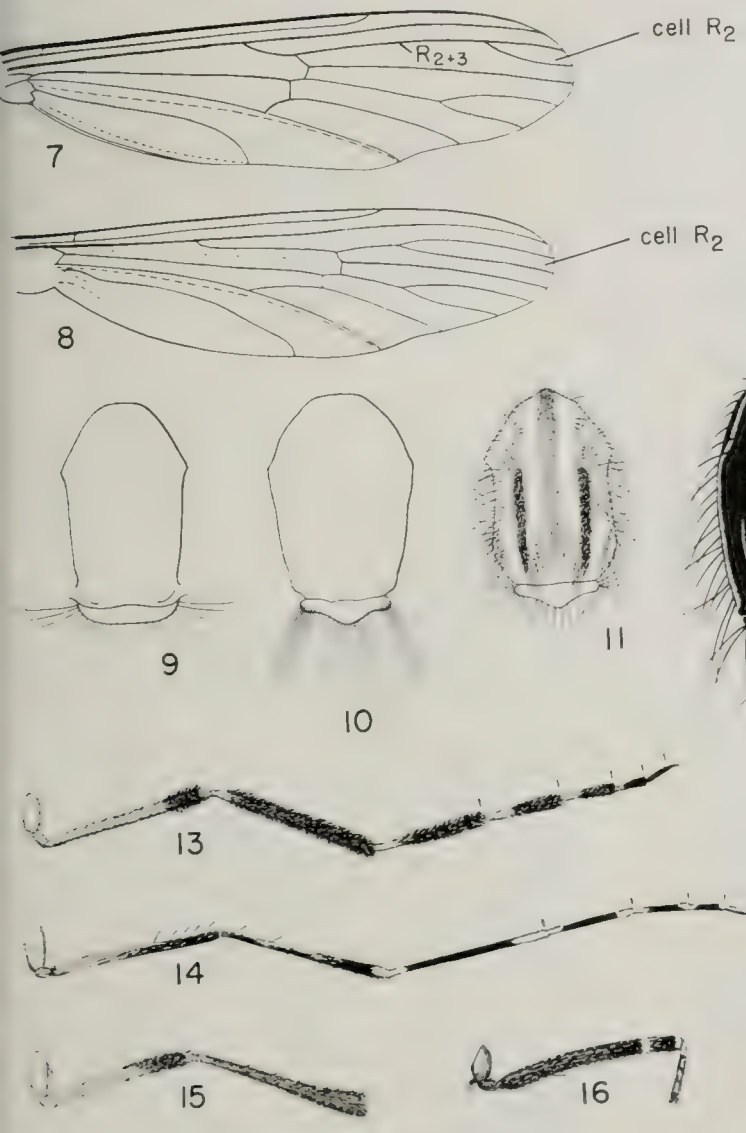
or the two types of scales mingled in a salt-and-pepper, patternless mixture.....**Aedes**

13. Mesonotum covered with a close mat of blue-black scales, having bristles only around periphery; postnotum with a tuft of small hairs. Sole Illinois representative, found in northern bogs..... ..... **Wyeomyia smithi**

Mesonotum either having scales other than blue-black or having several series of erect bristles extending above scales; postnotum without a tuft of hairs 14

14. Mesonotum either having broad lateral or mesal bands or areas of white or cream-colored scales (Fig. 44–58), or being almost entirely covered with cream-colored scales (Fig. 42).....15

Mesonotum mostly dark-scaled, at most with a scattering of light-colored scales, or with narrow weak lines of such scales 16



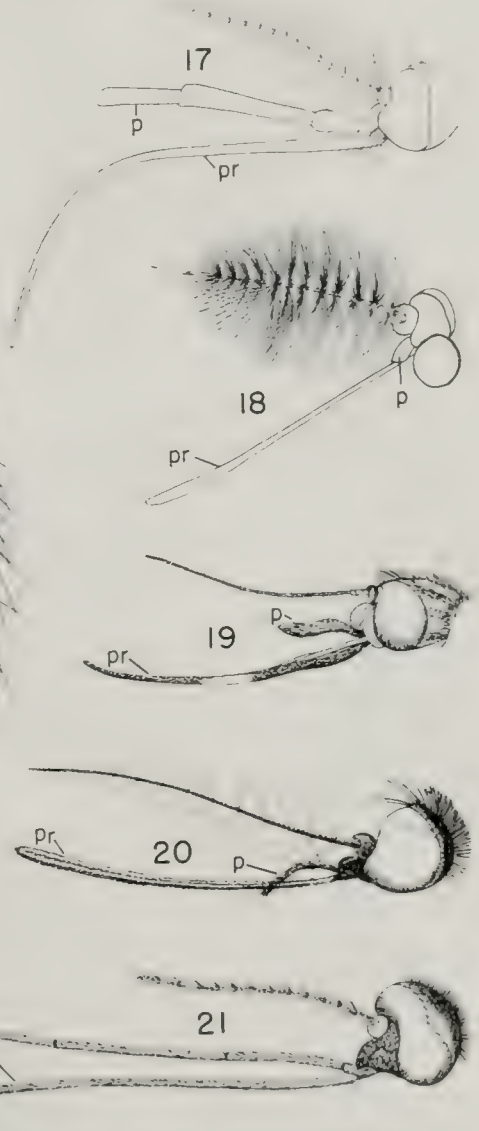


FIG. 7.—*Uranotaenia sapphirina*, wing.

FIG. 8.—*Aedes vexans*, wing.

FIG. 9.—*Anopheles quadrimaculatus*, mesonotum, including its posterior sclerite, the mesoscutellum.

FIG. 10.—*Aedes vexans*, mesonotum, including its posterior sclerite, the mesoscutellum.

FIG. 11.—*Psorophora ciliata*, mesonotum, including its posterior sclerite, the mesoscutellum.

FIG. 12.—*Orthopodomyia signifera*, mesonotum, including its posterior sclerite, the mesoscutellum.

FIG. 13.—*Psorophora ciliata*, hind leg.

FIG. 14.—*Aedes canadensis*, hind leg.

FIG. 15.—*Psorophora varipes*, portion of hind leg.

FIG. 16.—*Psorophora confinnis*, hind femur.

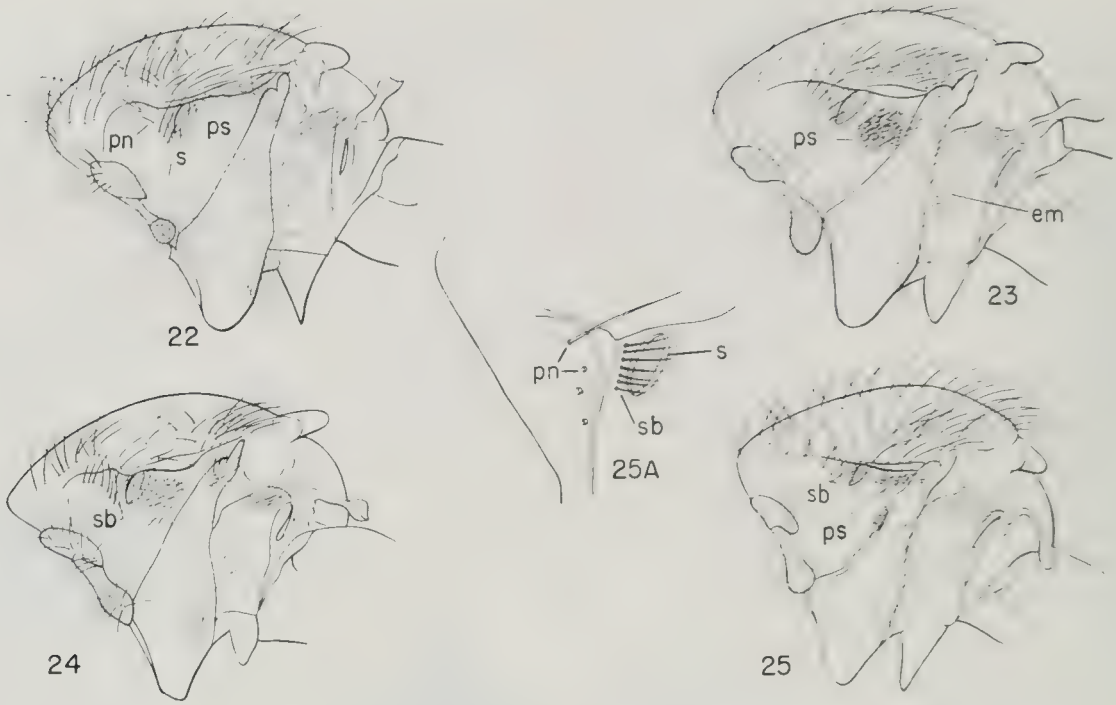
FIG. 17.—*Toxorhynchites rutilus septentrionalis*, female head. Abbreviations: *p*, palp; *pr*, proboscis.

FIG. 18.—*Uranotaenia sapphirina*, male head. Abbreviations: *p*, palp; *pr*, proboscis.

FIG. 19.—*Aedes sollicitans*, female head. Abbreviations: *p*, palp; *pr*, proboscis.

FIG. 20.—*Orthopodomyia signifera*, female head. Abbreviations: *p*, palp; *pr*, proboscis.

FIG. 21.—*Anopheles quadrimaculatus*, female head. Abbreviations: *p*, palp; *pr*, proboscis.



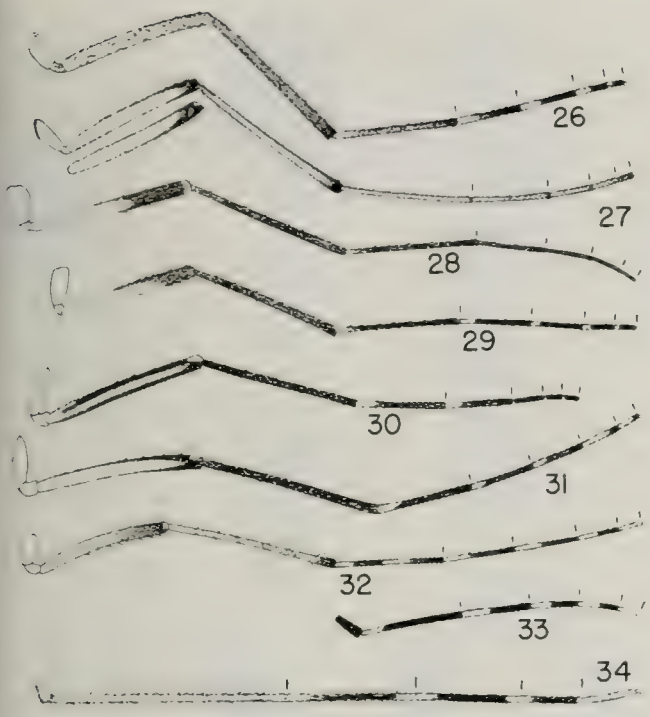
Adult thorax, lateral aspect. Abbreviations: *em*, mesepimeron; *pn*, pronotal bristles; *ps*, post-spiracular area; *s*, spiracle; *sb*, spiracular bristles.

FIG. 22.—*Mansonia perturbans.* FIG. 23.—*Aedes stimulans.* FIG. 24.—*Psorophora confinnis.*
FIG. 25.—*Culiseta inornata;* 25*A* shows enlarged view of pronotal and spiracular bristles.

15. Hind tibia enlarged and shaggy toward apex, with setae or hairs not longer than width of tibia at apex (Fig. 15); spiracular bristles present (Fig. 24) or absent ..... **Psorophora**
    Hind tibia slender to apex, not shaggy, often with a scattering of setae longer than width of tibia at apex (Fig. 14); spiracular bristles absent (Fig. 23) ..... **Aedes**
16. Post-spiracular area of thorax bare and spiracular bristles lacking, as in Fig. 22..... **Culex**
    Thorax either with post-spiracular area having bristles or scales (Fig. 23), or with spiracular bristles present (Fig. 25), or with both 17
17. Spiracular bristles present; post-spiracular area of thorax sometimes with scales but never with hairs (Fig. 25) ..... **Culiseta**
    Without spiracular bristles; post-spiracular area of thorax with hairs or hairs and scales (Fig. 23)... ..... **Aedes**

Key to Species of AEDES (Females)

1. Hind tarsus with white ring at base or apex of some or all segments (Fig. 14, 26) 2
   Hind tarsus without white ring at base or apex of any segment (Fig. 27, 28)..... 17
2. Hind tarsus with white rings at both ends of some segments (Fig. 34) 3
   Hind tarsus with white rings only at basal ends of segments (Fig. 26) 6
3. All wing scales dark, except sometimes at the extreme base of costa; mesonotum brown or reddish 4
   Most wing scales white, with a small mixture of black scales; mesonotum and abdomen predominantly cream color (Fig. 42)..... 5
4. Costa with black scales extending to extreme base; outer side of hind femur with some pale areas at base, grading to all dark at apex, the extreme tip with a few white scales. A widespread species common in woods throughout Illinois, especially in May; seldom collected at light ..... **canadensis**
   Costa with white scales along extreme base, beyond this with black scales (Fig. 35); outer side of hind femur very dark except for a conspicuous band of white scales at apex. A woodland species widespread in eastern and south-central states; known from Missouri and Wisconsin, but not yet recorded from Illinois ..... **atropalpus**
5. Apical portions of veins R_4, M_1, and M_2 with numerous black scales and few white scales. A Holarctic prairie species local in several areas in Illinois; associated with industrial wastes..... ..... **dorsalis**
   Apical portions of veins R_4, M_1, and M_2 with white scales predominating. Known from prairies of Michigan, Iowa, and westward; not yet recorded from Illinois ..... **campestris**
6. Proboscis dark but with a definite white band (Fig. 19) 7
   Proboscis nearly uniformly colored throughout...9



Hind legs and tarsi of *Aedes* females, anterior view.

FIG. 26.—*A. grossbecki,* hind leg.

FIG. 27.—*A. sticticus,* hind leg (posterior view of femur shown beneath).

FIG. 28.—*A. triseriatus,* hind leg.

FIG. 29.—*A. vexans,* hind leg.

FIG. 30.—*A. aegypti,* middle leg.

FIG. 31.—*A. aegypti,* hind leg.

FIG. 32.—*A. sollicitans,* hind leg.

FIG. 33.—*A. mitchellae,* hind tarsus.

FIG. 34.—*A. dorsalis,* hind tibia and tarsus.

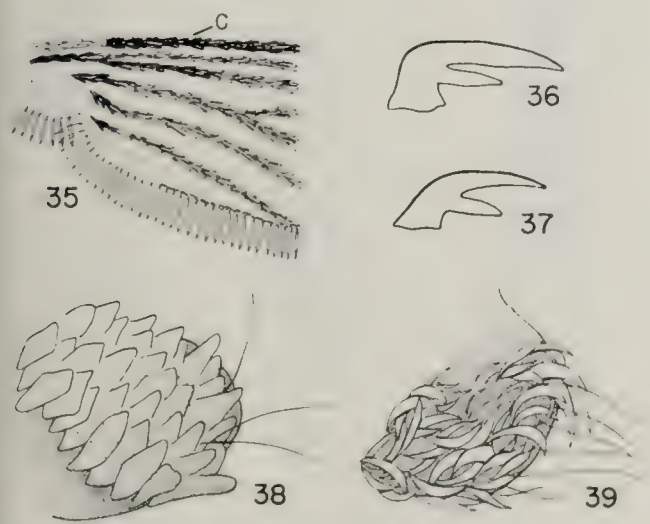


FIG. 35.—*Aedes atropalpus,* base of wing. Abbreviation: *C,* costa or costal vein.

FIG. 36.—*Aedes excrucians,* tarsal claw of female. (After Barr 1958.)

FIG. 37.—*Aedes fitchi,* tarsal claw of female. (After Barr 1958.)

FIG. 38.—*Aedes triseriatus,* scales on pronotal lobe, lateral aspect.

FIG. 39.—*Aedes thibaulti,* scales on pronotal lobe, lateral aspect.

7. All wing scales dark; first segment of hind tarsus black but with a single basal white band (Fig. 33). A woodland species of the southern states, twice found in Illinois in the Chicago area . . . **mitchellae**

Some wing scales black, some white, giving the wing a spotted appearance; first segment of hind tarsus frequently with a middle light band in addition to basal white band (Fig. 32) 8

8. Abdomen with extensive dorsal areas of cream or tawny scales and small lateral areas of white scales, the two colors definitely contrasting; first segment of hind tarsus with a yellow middle band. An eastern species locally abundant in Illinois, associated with sulfureted wastes . . . . . **sollicitans**

Abdomen with extensive dorsal areas as well as small lateral areas of white scales; first segment of hind tarsus with a white middle band or no middle band. A western prairie-savanna species recorded from Savanna, Illinois . . . . . **nigromaculis**

9. Mesonotum black but with lyre-shaped silver lines (Fig. 43). A nonresident, domestic, tropical adventive that is found occasionally in southern Illinois . . . . . **aegypti**

Mesonotum (Fig. 44–58) not as in Fig. 43, never with lyre-shaped silver lines but often with wider light stripes 10

10. White tarsal rings narrow (Fig. 29). A Holarctic species common throughout Illinois . . . . . **vexans**

White tarsal rings (Fig. 26) wider than in Fig. 29 11

11. All veins of wings with rows of very wide scales (Fig. 40); mesonotum (Fig. 44) with a large central black spot enlarged posteriorly. An eastern and south-central woodland species local in the southern half of Illinois . . . . . **grossbecki**

Some veins with rows of only long narrow scales (Fig. 41); mesonotum marked other than as shown in Fig. 44 12

12. Abdomen entirely covered with yellowish scales, without banding; most of scales of costa white; mesonotum entirely yellowish golden brown. A Holarctic species that is rare in open areas of extreme northern Illinois . . . . . **flavescens**

Abdomen either with decided banding or with patches of dark scales; majority of scales of costa dark; mesonotum with a pattern of gray, purplish, or reddish brown 13

13. Abdomen with a central stripe of pale scales, as in Fig. 48. Variants of . . . . . **nigromaculis**

Abdomen without a central stripe of pale scales . . 14

14. Tarsal claws of front and middle legs with each inner tooth long and each outer tooth bent abruptly over it (Fig. 36). A Holarctic species that is common locally in northern Illinois. Typical form of . . . . . **excrucians**

Tarsal claws of front and middle legs with each inner tooth shorter than that in Fig. 36 and each outer tooth less abruptly bent (Fig. 37) 15

15. Lower part of mesepimeron (Fig. 23) with 3 or more fine long bristles; mesonotum frequently patterned with light gray-brown, but occasionally with reddish brown. A northern transcontinental woodland species that is locally abundant in the woods of the northern half of Illinois; rare in light traps. Typical form of ..... **stimulans**

Lower part of mesepimeron with none to 2 fine long bristles 16

16. Mesonotum with a fairly narrow reddish brown stripe, flanked with white or cream (Fig. 54). A northern transcontinental species that is locally abundant in the vicinity of savanna pools in the northern fifth of Illinois. Typical form of ..... **fitchi**

Mesonotum with reddish brown central area wider than the stripe shown in Fig. 54 or area not well defined. Variant forms (for which reliable identification characters have not yet been found) of ..... **excrucians fitchi stimulans**

FIG. 40.—*Aedes grossbecki*, portion of wing. (The scales on the veins are wider than those in Fig. 41.)

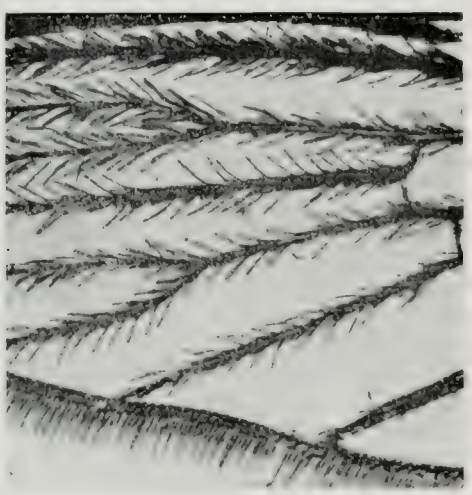


FIG. 41.—*Aedes stimulans*, portion of wing.

17. Integument and scaling bright golden yellow, except for a few small black-scaled areas. A southern species that is found locally in extreme southern Illinois ..... **fulvus pallens**

Integument gray, dark brown, or black, with few or no yellow scales 18

18. Mesonotum with a definite wide mesal silvery stripe flanked by dark areas (Fig. 45–47) 19

Mesonotum either without a mesal silvery stripe, or with a narrow one separating 2 dark stripes, these in turn flanked by light areas (Fig. 55) 21

19. Silvery stripe extending posteriorly only two-thirds of the total length of the mesonotum (Fig. 45). A southern woods-edge species; the only Illinois record is from Massac County ..... **infirmatus**

Silvery stripe extending full length of mesonotum, including scutellum (Fig. 46) 20

20. Silvery stripe of mesonotum wider than dark flanking areas (Fig. 46). A shy woodland species common but rarely seen in central and southern Illinois ..... **dupreei**

Silvery stripe of mesonotum no wider, often narrower, than dark flanking areas (Fig. 47). Two southern and eastern woodland species whose eggs and females are indistinguishable; one egg of *tormentor* and one female belonging to one of these species have been collected at Urbana, and one female at Unionville ..... **atlanticus tormentor**

21. Abdomen with pale scales forming a mesal stripe along the entire dorsum (Fig. 48); most of abdominal scales pale. A western prairie species; the only Illinois record is from Savanna ..... **spenceri**

Abdomen at most with transverse bands or lateral triangles of pale scales 22

22. Mesonotum with one or a pair of black or very dark mesal areas flanked by gray or silvery areas (Fig. 49–58) 23

Mesonotum fairly uniform in color, brown or tawny, sometimes with mesal area reddish brown and lateral areas light golden brown 31

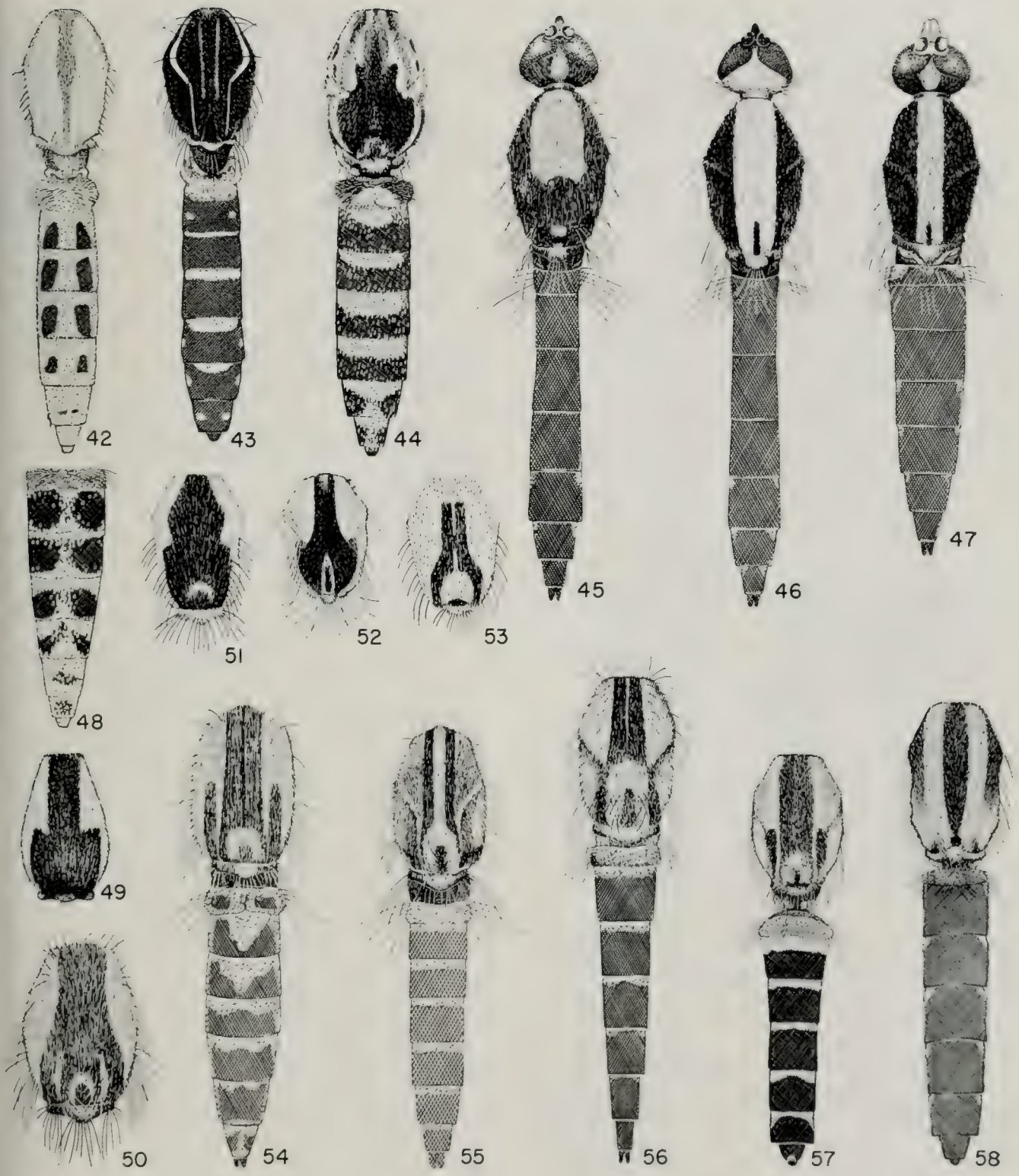
23. Mesonotum with a mesal pair of dark stripes separated by a mesal stripe of silvery or light golden scales (Fig. 55, 56) 24

Mesonotum with an undivided dark mesal area .. 26

24. Dark stripes not extending on to anterior third of mesonotum (Fig. 53). A western species known locally from central and northern Illinois ..... **hendersoni**

Dark stripes extending full length of mesonotum 25

25. Dark stripes of mesonotum separated by a wide mesal stripe of pale scales (Fig. 55). A Holarctic



Dorsal color patterns of *Aedes* females.

FIG. 42.—*A. dorsalis*, thorax and abdomen.
FIG. 43.—*A. aegypti*, thorax and abdomen.
G. 44.—*A. grossbecki*, thorax and abdomen.
FIG. 45.—*A. infirmatus*, head and body.
FIG. 46.—*A. dupreei*, head and body.
FIG. 47.—*A. atlanticus*, head and body.
FIG. 48.—*A. spenceri*, dorsum of abdomen.
FIG. 49.—*A. thibaulti*, dorsum of thorax. (After King, Bradley, & McNeel 1939.)
FIG. 50.—*A. aurifer*, thorax.
FIG. 51.—*A. triseriatus*, thorax, dark phase.
FIG. 52.—*A. triseriatus*, thorax, light phase.
FIG. 53.—*A. hendersoni*, thorax.
FIG. 54.—*A. fitchi*, thorax and abdomen.
FIG. 55.—*A. communis*, thorax and abdomen.
FIG. 56.—*A. sticticus*, thorax and abdomen, light phase.
FIG. 57.—*A. sticticus*, thorax and abdomen, dark phase.
FIG. 58.—*A. trivittatus*, thorax and abdomen.

northern species not yet found but to be expected in northern Illinois ..... **communis**

Dark stripes of mesonotum separated by a very narrow mesal stripe of pale scales (Fig. 56). A Holarctic woodland floodplain species abundant along rivers throughout Illinois. Typical form of ..... **sticticus**

26. Central stripe of mesonotum tapering posteriorly to a narrow point, well defined (Fig. 58). A central and eastern woodland species abundant over most of Illinois ..... **trivittatus**

Central stripe of mesonotum either wider posteriorly (Fig. 50, 51) than in Fig. 58 or parallel sided (Fig. 57) 27

27. Central stripe of mesonotum parallel sided, sometimes with a pair of detached short dark stripes along posterior half (Fig. 57); dorsum of each abdominal segment with complete basal white band. Slightly rubbed specimens of ..... **sticticus**

Central stripe of mesonotum narrower in anterior than in posterior part, usually widened posteriorly to almost the full width of the mesonotum (Fig. 49–52); dorsum of each abdominal segment mostly blue-black, perhaps with lateral white spots, but without white band 28

28. Scales of lateral area of pronotal lobe white and wide, markedly overlapping to form a solid shingled area (Fig. 38) 29

Scales of lateral area of pronotal lobe long and narrow, tawny or yellowish in color and not solidly shingled (Fig. 39) 30

29. Dark mark of mesonotum wide (Fig. 51), with a definite shoulder where wider posterior portion begins to narrow to narrower anterior portion. An eastern species sometimes common in wooded areas of Illinois, particularly in southern counties ..... **triseriatus**

Dark mark of mesonotum as narrow as in Fig. 52, the anterior portion tapering uniformly from wider to narrower portion ..... light specimens of **triseriatus**
dark specimens of **hendersoni**

30. Mesal dark mark of mesonotum with anterior portion narrow, suddenly widened beyond middle to include nearly full width of mesonotum (Fig. 49); anterior lateral areas bright grayish. An eastern and southern woodland species; in Illinois, restricted to floodplains in the southern half of the state where tupelo gum trees are present ..... **thibaulti**

Mesal dark mark of mesonotum with anterior part wider than in Fig. 49, widening gradually or by small steps to posterior margin (Fig. 50); anterior lateral areas grayish, shading to a golden tint where they merge with mesal dark area. A northeastern and north-central woodland species known in Illinois only from Karnak ..... **aurifer**

31. Base of costa with a short patch of pale scales, as in Fig. 35. A northern species occurring in open woods; not yet found but to be expected in northern Illinois ..... **trichurus**

Base of costa at most with a few scattered pale scales 32

32. Mesepimeron with lower third bare, upper two-thirds covered with a patch of white scales; coxa (basal segment) of front leg with a patch of dark scales; membrane posterior to this coxa without scales; wing at most 4.3 mm long. A Holarctic northern species common in marsh and bog areas in northern Illinois; local in dense woods of central Illinois ..... **cinereus**

Mesepimeron with white scales extending to its lower edge; coxa of front leg with only pale scales; membrane posterior to this coxa with numerous pale scales; wing usually 4.8 mm long or longer. Two extremely similar northern species, eastern *abserratus* and Holarctic *punctor*, both found in northern Illinois bogs ..... **abserratus**
punctor

Key to Species of ANOPHELES (Females)

1. Wing with spots or bars of white or yellowish white scales along anterior margin and anal vein (Fig. 59, 60) 2

Wing without any pale patches, all scales dark (Fig. 61) except sometimes those on apical fringe 3

2. Anal vein with 3 short dark bars separated by white bars, costa with a white spot only at apex of wing; palp dark except for white bands (Fig. 60). An eastern and southern species local in Illinois ..... **crucians**

Anal vein with apical half and extreme base black, and with a single white area between; costa with an apical white spot and usually also a preapical spot or bar; palp black, unbanded (Fig. 59). A transcontinental species widespread in Illinois, common before July ..... **punctipennis**

3. Tip of wing with a patch of silvery or golden fringe scales; dark wing spots very pronounced. A northern species not yet found, but to be expected, in Illinois ..... **earlei**

Tip of wing with fringe not different from remainder; dark wing spots either pronounced or obscure 4

4. Palp black except for rings of white scales at joints (Fig. 62). An eastern species widespread in Illinois but not common south of the northern fifth of the state ..... **walkeri**

Palp entirely black, without rings of white scales (Fig. 61) 5

5. Wing without a trace of spotting; wing length about 3.5 mm. An eastern and southern woodland species widespread but rarely seen in Illinois ..... **barberi**

Wing with definite darker areas, giving a spotted appearance (Fig. 61); wing length about 5.0 mm.

Parts of *Anopheles* adults. Abbreviations: *C*, costa; *a*, anal vein; *p*, palp; *pr*, proboscis. (After Ross & Roberts 1943.)
FIG. 59.—*A. punctipennis*, wing and mouthparts.
FIG. 60.—*A. crucians*, wing and mouthparts.
FIG. 61.—*A. quadrimaculatus*, wing and mouthparts.
FIG. 62.—*A. walkeri*, mouthparts.

An eastern and southern species widespread in Illinois, abundant near lakes in summer..... ..... **quadrimaculatus**

Key to Species of CULEX (Females)

1. Proboscis and hind tarsus with white bands; mesonotum with white longitudinal lines (Fig. 63*A*). A transcontinental species of open habitats, widespread but rarely collected in Illinois.....**tarsalis**
   Proboscis and hind tarsus entirely dark; mesonotum with pale dots but without white longitudinal lines 2
2. Dorsum of abdomen with apical white bands or apical lateral spots on some of the segments, and without basal bands. A Holarctic innocuous species widespread and often trapped in Illinois.... ..... **territans**
   Dorsum of abdomen without apical bands, with (Fig. 63*B, C*) or without definite basal bands....3
3. Scales of veins R_2 and R_3 very long and slender (Fig. 64*A*), similar to scales on stem of R_s in Fig. 64*B* (examination of wing mount under a compound microscope is best method for seeing this character) (subgenus *Culex*) 4
   Scales of veins R_2 and R_3 short and wide (Fig. 64*B*) contrasting with long, slender scales on stem of R_s (subgenus *Melanoconion*).....5
4. Dorsal abdominal segments with dingy and often inconspicuous basal bands of yellowish or brownish scales, the bands usually irregular and narrow. An eastern and central species widespread and annoying in Illinois but seldom trapped at light ..... **salinarius**
   Dorsal abdominal segments with bright and conspicuous basal bands of white scales, the bands of the middle segments wide (Fig. 63*B, C*). Three widespread, frequently trapped species of the subgenus *Culex*, each common in Illinois, females of which cannot be identified with accuracy..**pipiens**
   quinquefasciatus
   restuans
5. Top of head with a large mesal triangle of narrow scales, the area between this triangle and eyes

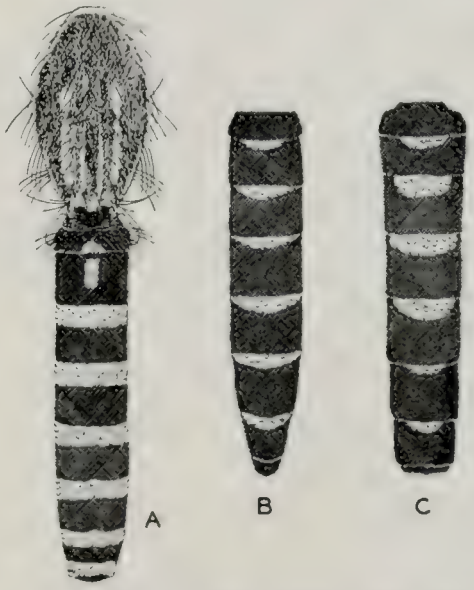
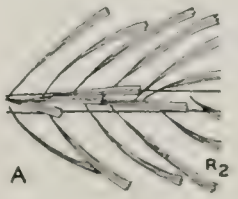


FIG. 63.—*Culex* females, dorsal aspect: *A*, *C. tarsalis*, thorax and abdomen; *B*, typical *C. pipiens*, abdomen; *C*, typical *C. quinquefasciatus*, abdomen.



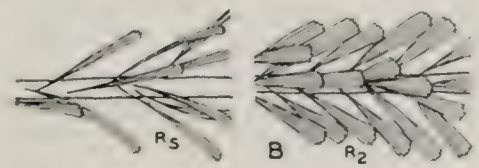


FIG. 64.—*A. Culex restuans*, scales on wing vein R_2; *B, C. erraticus*, scales on wing veins R_s and R_2.

covered with wide overlapping scales. A small annoying species widespread and often abundant in Illinois ..... **erraticus**

Top of head entirely covered with wide overlapping scales except occasionally for a narrow mesal line of narrow scales. An eastern and southern species found rarely in southern Illinois..... **peccator**

Key to Species of CULISETA (Females)

1. Dorsum of abdomen with only very dark, purplish scales; wing less than 4 mm long. An eastern and central woodland species not yet found, but to be expected, in Illinois..... **melanura**

   Dorsum of abdomen with scattered tawny or paler scales or bands of such scales; wing more than 5 mm long 2

2. Wing with a mixture of light scales and dark scales; tarsus without pale bands but with a sprinkling of pale scales. A widespread marsh species common throughout Illinois in April and May .... **inornata**

   Wing with dark scales only; first 1 or 2 tarsal segments with slight but distinct pale bands at each end 3

3. Middle dorsal segments of abdomen each with a wide and conspicuous basal band of white scales. A Holarctic species local in northern Illinois.... ..... **morsitans**

   Middle dorsal segments of abdomen each with an apical and a basal pale band, the bands inconspicuous and composed of light brown scales. A rarely collected species known only from Minnesota and northern Illinois..... **minnesotae**

Key to Species of ORTHOPODOMYIA (Females)

Two species of this genus, *alba* and *signifera,* have been found in Illinois, but the two species can be identified to date only in the larval stage. They are rarely collected in light traps. Neither bites man.

Key to Species of PSOROPHORA (Females)

1. Wing length over 6.5 mm, usually 7 to 8 mm; mesonotum having a narrow mesal band of scales flanked by a linear bare polished band on each side (Fig. 11); hind femur with a prominent tuft of hairs at apex (Fig. 13)..... 2

   Wing length under 5 mm, usually 3.5 to 4.5 mm; mesonotum with entire area scaled; hind femur (Fig. 15) without a well-marked tuft of hairs at apex 3

2. Mesonotum with mesal band of scales yellow, hind tibia and tarsus very bushy (as shown in drawing on cover of this publication). An eastern and tropical species widespread and sometimes common in both open and wooded habitats in Illinois ..... **ciliata**

   Mesonotum with mesal band of scales black, hind tibia and tarsus pubescent but not unusually bushy. A southern and tropical woodland species sometimes locally abundant on floodplains in Illinois ..... **howardi**

3. Hind tarsus entirely purple 4

   Hind tarsus partly white, often with all segments banded with white or some all white..... 5

4. Dorsum of abdomen with apical yellowish bands that are slightly broken on the meson. A southern and tropical woodland and pasture species found locally in the southern half of Illinois... ..... **cyanescens**

   Dorsum of abdomen with only small lateral white spots, as in Fig. 58. Variant specimens of..... ..... **varipes**

5. Most of the tarsal segments each with apex dark and base with a white band, as in Fig. 13; wing having a mixture of dark scales and white scales 6

   Most of the tarsal segments each entirely dark or entirely light; a leg may be banded but with an alternation of entirely dark and entirely light segments; rarely one segment may be banded; wing having all dark scales 7

6. Wing mostly dark scaled but with a fairly even speckling of white scales; basal segment of hind tarsus nearly black, but with two bright white bands, a narrow one at extreme base and a wider one at middle of segment. A widespread American species of temperate and tropical open habitats, locally abundant throughout Illinois ..... **confinnis**

   Wing with white scales grouped into definite lines or patches on some veins; basal segment of hind tarsus mostly white scaled but with dark scales intermingled uniformly along its entire length. A southern and Mexican species of open habitats, locally abundant throughout Illinois..... **discolor**

7. Mesonotum golden scaled over its entire area. An eastern and tropical woodland species widespread along floodplains in Illinois..... **ferox**

   Mesonotum with mesal half black scaled, lateral portions white scaled, scales of the two colors forming longitudinal bands 8

8. Hind tarsus having next to last segment completely or partly white, the last one black. A southern and tropical woodland species widespread along floodplains in the southern half of Illinois..... ..... **varipes**

   Hind tarsus having the last 2 or 2½ segments white, the remainder black 9

9. Apex of femur, or "knee," with a narrow white band. An eastern and southern woodland species widespread along floodplains in Illinois..**horrida**

   Apex of femur dark, without a band. A midwestern species not yet known, but to be expected, in woodlands of Illinois..... **longipalpis**

KEYS TO CULICIDAE MALES

Some of the parts named in these keys are illustrated in Fig. 65; others are included in the diagnostic drawings

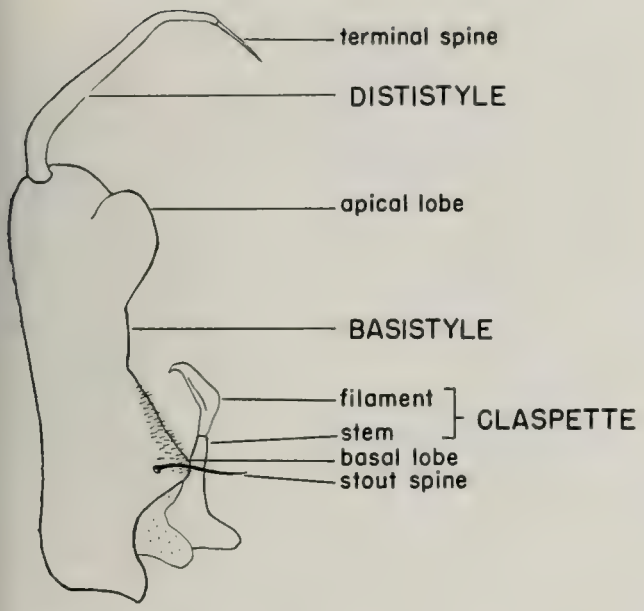


FIG. 65.—Diagram of the style (basistyle and dististyle) and claspette of the male genitalia, indicating the terminology used for the parts.

illustrating the couplets. Although some males can be identified by the set of keys designed for females (especially the key to genera), those males having minute parts difficult to see can be more easily and reliably identified by the set of keys presented in the following pages.

Key to Genera of CULICIDAE (Males)

1. Fork of vein R_{2+3} close to apical margin of wing, cell R_2 only half the length of its stalk, R_{2+3} (Fig. 7) 2
   Fork of vein R_{2+3} much farther from apical margin of wing, so that cell R_2 is at least as long as its stalk (Fig. 8) 3
2. Palp short and inconspicuous (Fig. 18); wing less than 3.5 mm long; genitalia as in Fig. 69..... **Uranotaenia sapphirina**
   Palp long and massive (Fig. 66); wing more than 6 mm long; genitalia as in Fig. 72..... **Toxorhynchites rutilus septentrionalis**
3. Mesoscutellum with apical margin evenly rounded, the hairs arranged evenly along it (Fig. 9); palp clavate (Fig. 67)..... **Anopheles**
   Mesoscutellum with apical margin incised to form a mesal lobe and 2 lateral lobes, with the hairs grouped on these 3 lobes (Fig. 10); palp not clavate 4
4. Dististyle with many irregular lobes (Fig. 71)..... **Wyeomyia smithi**
   Dististyle either unbranched, as in Fig. 72, or with only 1 or 2 simple lobes (Fig. 118)..... 5
5. Apical spine of dististyle double, each ray short and stout (Fig. 114*A*); phallosome without lateral teeth at apex (Fig. 114*B*) ..... **Culiseta**
   Apical spine of dististyle single, as in Fig. 72..... 6
6. Apical spine of dististyle cone shaped, wide and truncate at apex, and with what appears to be a minute fringe along the edge (Fig. 70)..... **Orthopodomyia**
   Apical spine of dististyle either parallel sided or tapering to apex, as in Fig. 68, 72..... 7
7. Apex of basistyle continuing as a pointed lobe beyond insertion of dististyle (Fig. 75)..... **Aedes**
   Dististyle situated at apex of basistyle, as in Fig. 72, or truncate (Fig. 120) 8
8. A subcylindrical projection (claspette) arising from near base of each basistyle and tipped with 1 or more spines or processes (Fig. 76–100, 117–123) 9
   Claspette not present (Fig. 74)..... 11
9. Apex of claspette bearing a single sclerous process that is filamentous or bladelike (Fig. 76–100, 124) 10
   Apex of claspette bearing a cluster of spines, one of which may appear to be a process (Fig. 117–123) ..... **Psorophora**
10. Claspette branched, with a long basal as well as apical branch (Fig. 124)..... **Psorophora**
    Claspette not branched or, at most, with basal branch short (Fig. 76–100) ..... **Aedes**
11. Dististyle bearing a long hook and a large mesal membranous lobe (Fig. 118)..... **Psorophora**
    Dististyle without an accessory mesal membranous lobe 12
12. Basistyle with a shoulder or mesal lobe (*c* in Fig. 103*A*) near apex, this lobe bearing a cluster of specialized bladelike or spatulate spines, which are frequently complex in structure (Fig. 103*A*, 111*A*) ..... **Culex**

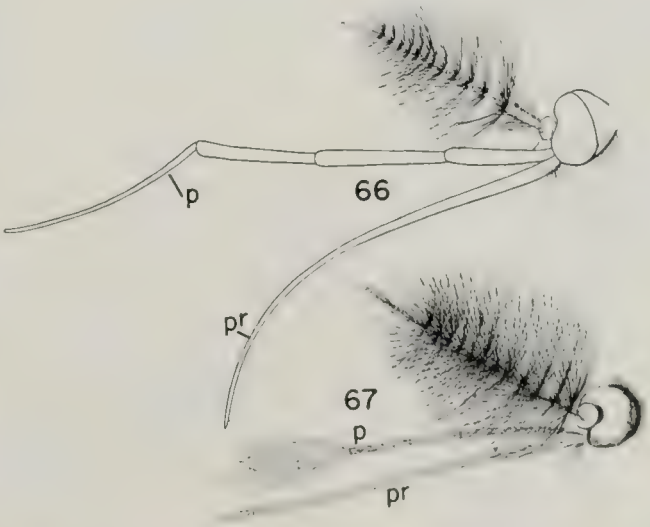


FIG. 66.—*Toxorhynchites rutilus septentrionalis*, male head. Abbreviations: *p*, palp; *pr*, proboscis.

FIG. 67.—*Anopheles quadrimaculatus*, male head. Abbreviations: *p*, palp; *pr*, proboscis.

Basistyle either without a shoulder near apex, or the shoulder, if present, bearing only narrow spines 13

13. Basistyle with a stout rodlike structure on mesal face near middle; dististyle with apical half very wide, its terminal spine stout and spurlike (Fig. 68) ..... **Mansonia perturbans**

Basistyle frequently with one or more stout hairs on mesal face near middle or base, but never with a rodlike structure (Fig. 74); dististyle not as in Fig. 68 ..... **Aedes**

Key to Species of AEDES (Males)

1. Dististyle arising before apex of basistyle, the portion of the basistyle which extends beyond the dististyle forming an apical cone (Fig. 75) ..... **cinereus**

Dististyle arising at extreme apex of basistyle (Fig. 73) 2

2. Dististyle wide near apex, terminating in a sharp projection that is nearly as long as terminal spine; claspette a small bushy lobe (Fig. 73) .... **vexans**

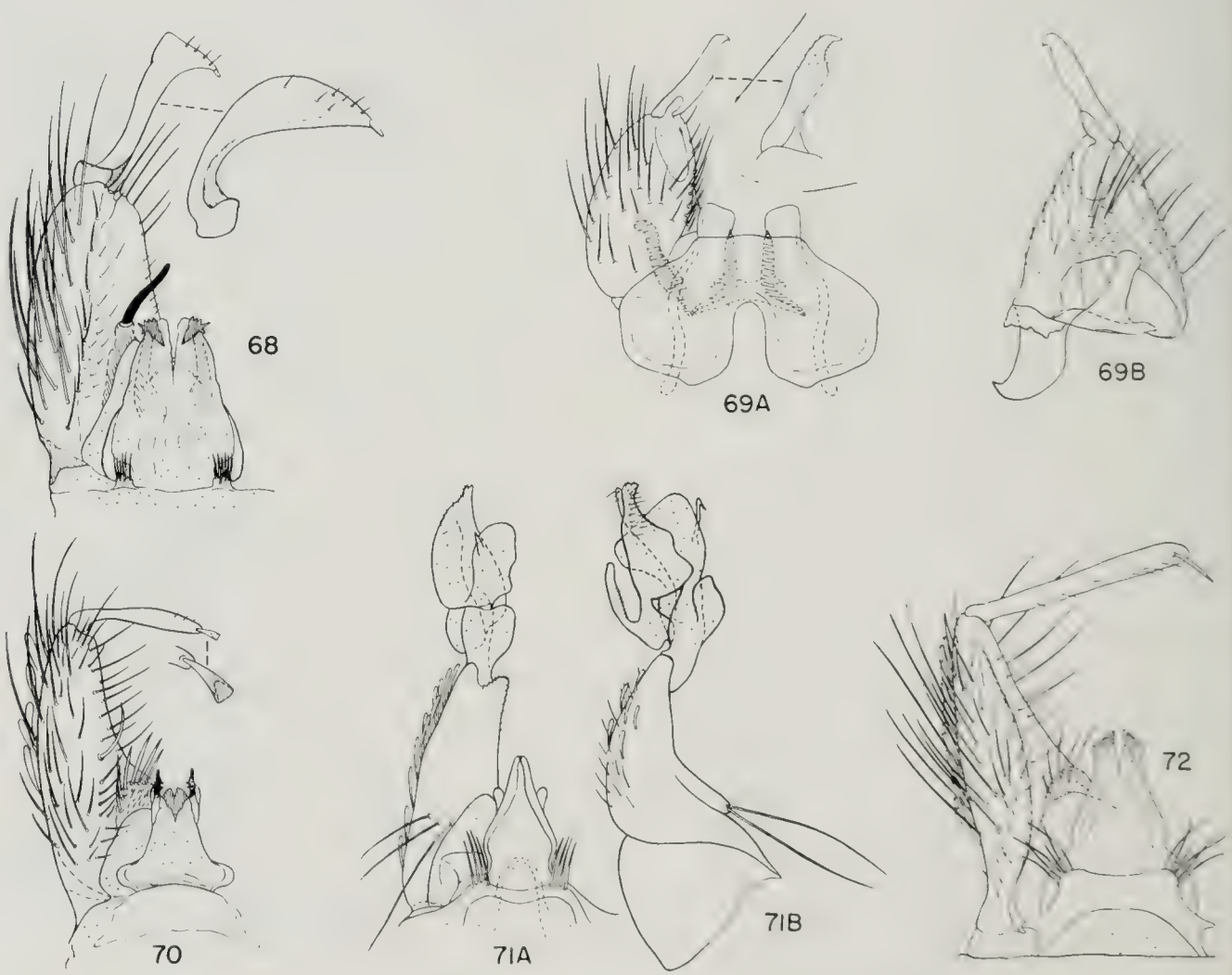
Dististyle narrow at apex, tipped by terminal spine (Fig. 74) 3

3. Claspette absent (Fig. 74) ..... **aegypti**

Claspette present (Fig. 76–100) 4

4. Stem of claspette branched near tip, one branch ending in a hair, the other bearing the filament (Fig. 79*C*); filament massive and contorted, thin and pale ..... **thibaulti**

Stem of claspette with an unbranched apex bearing the filament (Fig. 78*C*, 84*F*); filament of various sizes and shapes, but never both massive and contorted 5



Male genitalia.

FIG. 68.—*Mansonia perturbans*, ventral aspect, and lateral aspect of dististyle.

FIG. 69.—*Uranotaenia sapphirina*: *A*, ventral aspect, and lateral aspect of dististyle; *B*, mesal aspect of clasper, with phallosome and other mesal structures removed.

FIG. 70.—*Orthopodomyia signifera*, ventral aspect.

FIG. 71.—*Wyeomyia smithi*: *A*, ventral aspect; *B*, lateral aspect. The apical contorted structure is the dististyle.

FIG. 72.—*Toxorhynchites rutilus septentrionalis*, ventral aspect. The internal phallosome is not shown.

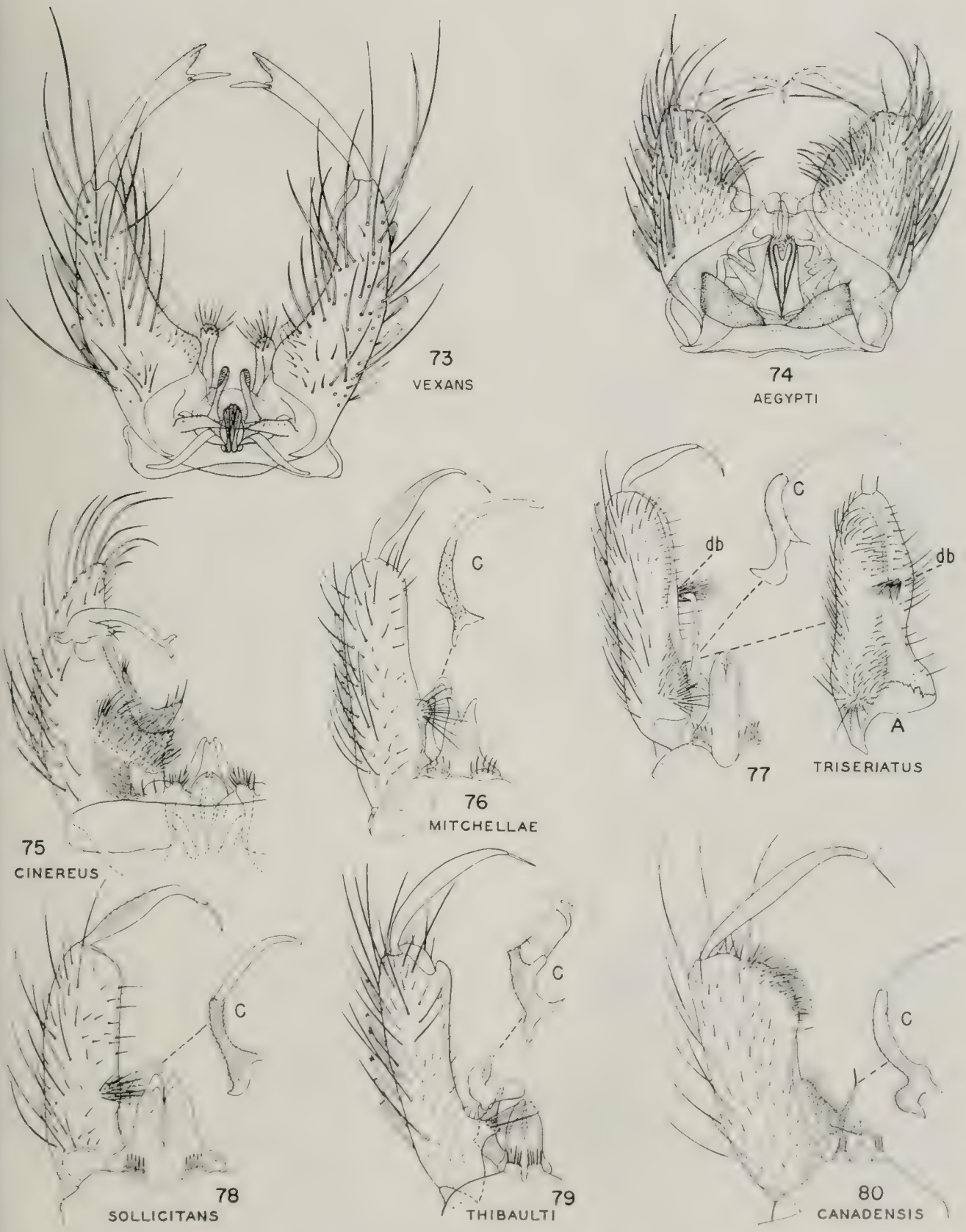


FIG. 73–80.—*Aedes*, male genitalia, ventral aspect: *A*, mesal aspect of basistyle; *C*, claspette, lateral aspect. Abbreviation: *db*, dorsal brush. (Fig. 73 and 74 after Matheson 1944.)

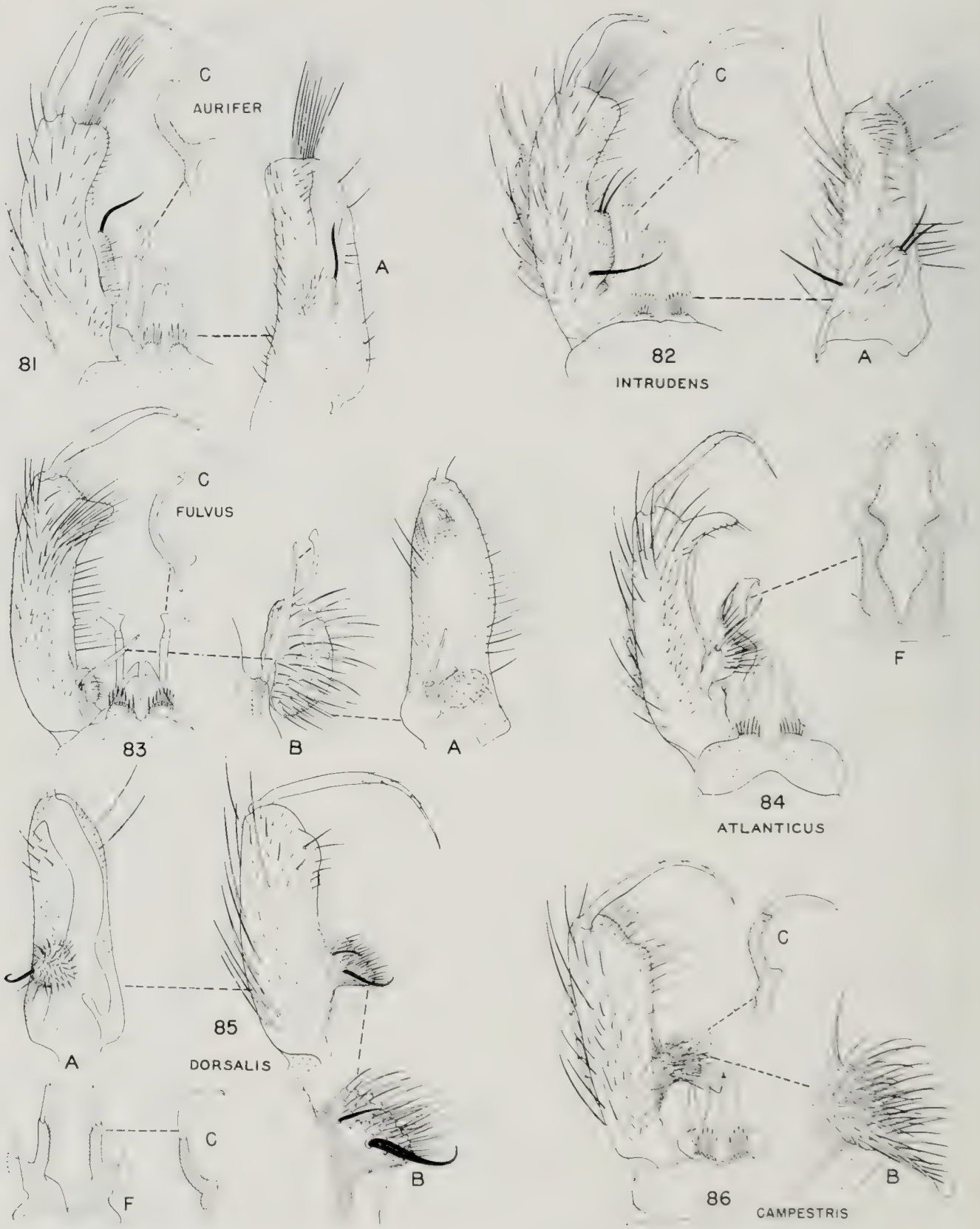


FIG. 81–86.—*Aedes*, male genitalia, ventral aspect: *A*, basistyle, mesal aspect; *B*, enlarged detail of basal lobe, ventral aspect; *C*, claspette, lateral aspect; *F*, claspette, dorsal aspect.

FIG. 87–93.—*Aedes*, male genitalia, ventral aspect: *A*, basistyle, mesal aspect; *B*, basal lobe, ventral aspect; *C*, claspette, lateral aspect, and in Fig. 88 and 89 a detail of its apex; *D*, basal lobe, posterior aspect.

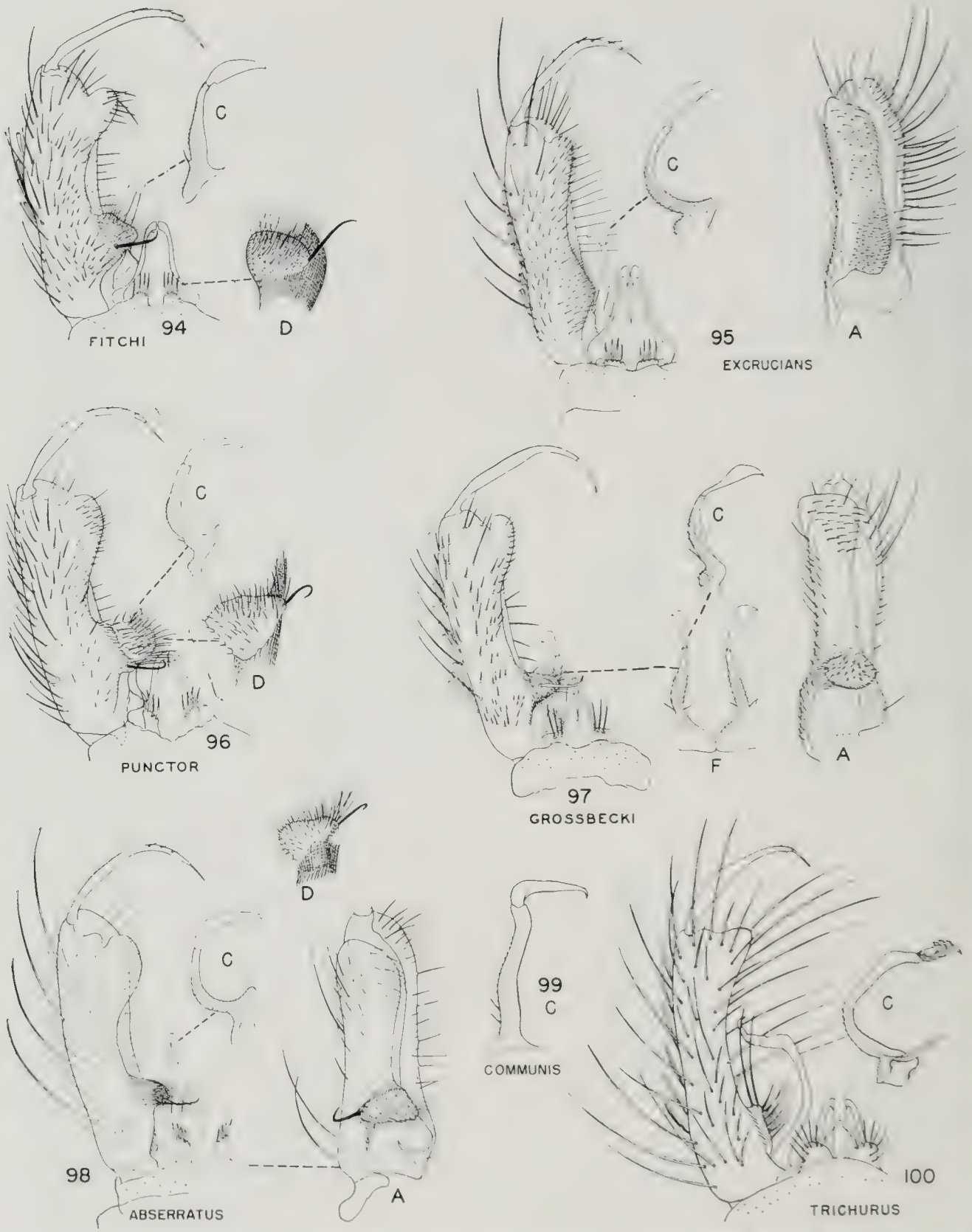


FIG. 94–100.—*Aedes*, male genitalia, ventral aspect: *A*, basistyle, mesal aspect; *C*, claspette, lateral aspect; *D*, basal lobe, posterior aspect; *F*, claspette, dorsal aspect.

5. Basistyle without apical lobe (Fig. 76–78) 6
Basistyle with apical lobe definitely developed (Fig. 80, 85) or represented by a mass of long hairs (Fig. 81, 82) 9

6. Basistyle with a thick brush of hairs, *db*, on dorsal side (Fig. 77); basal lobe with a large area of hairs ..... **triseriatus hendersoni**
Basistyle without a brush of hairs on dorsal side, but with a definite brush forming the basal lobe (Fig. 76, 78) 7

7. Filament of claspette only about half as long as stem of claspette, similar to that in Fig. 96*C* ..... **atropalpus**
Filament of claspette approximately as long as stem of claspette (Fig. 76*C*) 8

8. Basal lobe a distinct, raised prominence; basistyle considerably widened at basal lobe (Fig. 76) ..... **mitchellae**
Basal lobe represented by only a slightly raised disc-like area; basistyle only imperceptibly widened at this point (Fig. 78) ..... **nigromaculis sollicitans**

9. Basistyle with a dense brush of long posteriorly directed hairs at apex (Fig. 81); basal lobe forming a flat sclerite on mesal face of basistyle, the lobe bearing a single long spine at its apex (Fig. 81*A*) ..... **aurifer**
Basistyle without a dense apical brush of long spines, but with a well-developed apical lobe (Fig. 83); basal lobe not as in Fig. 81*A*, either projecting from basistyle, or with a large spine at its base, or 2 spines at its apex (Fig. 82*A*), or without a spine, sometimes with a cluster of long hairs ... 10

10. Integument of almost entire body yellow; stout spine arising from base of basal lobe flattened and widened at tip (Fig. 83*B*) ..... **fulvus pallens**
Integument chiefly dark brown or black; if a stout spine arises from basal lobe, it tapers to a pointed tip (Fig. 84, 85*A*, *B*) 11

11. Basal lobe having 2 unusually long and fairly stout hairs arising from apical margin (Fig. 100); filament of claspette irregular and appearing twisted ..... **trichurus**
Basal lobe without such a pair of long and stout hairs arising from apical margin; filament of claspette either contorted (Fig. 84*F*), or not (Fig. 85*C*) 12

12. Large stout spine of basal lobe situated on a separate elevated finger-like process (Fig. 84) 13
Large stout spine of basal lobe either not on an elevated finger-like process (Fig. 85) or absent 14

13. Claspette forming a sinuate process without a distinct division into a basal stalk and an apical filament (Fig. 84*F*) ..... **atlanticus**
Claspette distinctly divided into a basal stalk and a sharply delineated curved apical filament, much as in Fig. 96*C* ..... **tormentor**

14. Apical lobe with a large dense patch of spatulate hairs (Fig. 80) ..... **canadensis**
Apical lobe with hairs tapering evenly (Fig. 85) 15

15. Basal lobe with 2 stout spines and many small hairs (Fig. 85*B*); hairs near the 2 stout spines shorter than hairs on basal lobe in Fig. 86*B* ..... **dorsalis**
Basal lobe at most with only 1 stout spine, sometimes with some of the hairs on basal lobe very long (Fig. 86*B*) 16

16. Basal lobe appearing detached, joined to basistyle by only a narrow sclerotized strip (Fig. 87, 88*B*, 89*A*) 17
Basal lobe forming a solid part of the basistyle (Fig. 90–98) 19

17. Apical lobe small (Fig. 87) ..... **dupreei**
Apical lobe large (Fig. 88) 18

18. Filament of claspette wide, its lower basal corner produced into a definite angle, Fig. 89*C*; mesal aspect of apical lobe long and narrow (Fig. 89*A*) ..... **spenceri**
Filament of claspette narrower than that in Fig. 89*C*, its lower margin almost continuous in outline with the stem of the claspette; mesal aspect of apical lobe shorter than that in Fig. 89*A*, decidedly ovate (Fig. 88*A*) ..... **sticticus**

19. Basal lobe without a stout spine, having only abundant short hairs (Fig. 95) ..... **excrucians**
Basal lobe with a conspicuous stout spine or a group of long hairs (Fig. 90) 20

20. Filament of claspette having an upper point which is produced backward into a sharp basal barb (Fig. 90*C*) 21
Filament of claspette without a barb (Fig. 92*C*), at most with a sharp upper corner (Fig. 93*C*) 22

21. Stout dorsal spine of basal lobe having an angulate thickening near its base (Fig. 90) ..... **infirmatus**
Stout dorsal spine of basal lobe evenly sinuate throughout its length (Fig. 91) ..... **trivittatus**

22. Basal lobe composed primarily of an area of short hairs forming the basal portion of the mesal face of the basistyle (Fig. 92, 93) 23
Basal lobe represented by a distinct lobe projecting mesally from the basistyle (Fig. 96–98) 24

23. Area comprising the basal lobe long and triangular (Fig. 92); filament of claspette fairly short (Fig. 92*C*); no area of membrane present within the basal lobe (Fig. 92*A*) ..... **flavescens**
Area comprising basal lobe shorter than that in Fig. 92, its lower portion somewhat projecting (Fig. 93); filament of claspette long and slender (Fig. 93*C*); an oval area of membrane present above the stout spine (Fig. 93*A*) ..... **stimulans**

24. Filament of claspette with an elongate narrow neck-like base (Fig. 97*C*) ..... **grossbecki**
Filament of claspette without a well-differentiated basal neck (Fig. 98*C*), or with a short one (Fig. 94*C*) 25

25. Basal lobe with membranous hair-bearing portion that, from the ventral aspect, is hidden behind a projecting ventral shoulder (Fig. 98) and that projects ventromesad (Fig. 98*A*) ..... **abserratus**

Basal lobe with membranous hair-bearing portion that is well exposed from the ventral aspect and is without a projecting ventral shoulder (Fig. 94, 96) 26

26. Apical lobe of basistyle moderately narrow and forming a somewhat angulate mesal flange (Fig. 86) ..... **campestris**

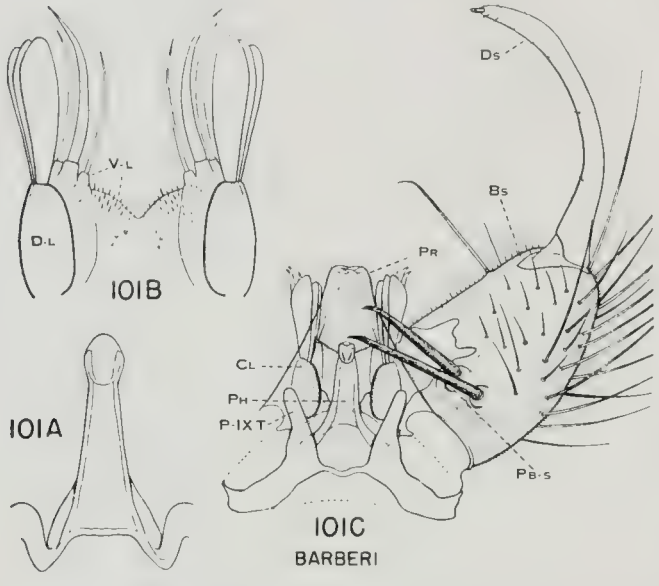
Apical lobe of basistyle large and ovate (Fig. 94, 96) 27

bars; costa with a white bar only at apex of wing; palp dark but with white bands (Fig. 60) ..... **crucians**

Anal vein with extreme base and most of apical half black and with a single white area between; costa with an apical white bar and usually also a preapical bar; palp black, unbanded (Fig. 59) ..... **punctipennis**

3. Tip of wing with a patch of silvery or golden fringe scales; dark wing spots very pronounced... **earlei**

Tip of wing with fringe not different from remainder; dark wing spots either pronounced or obscure 4



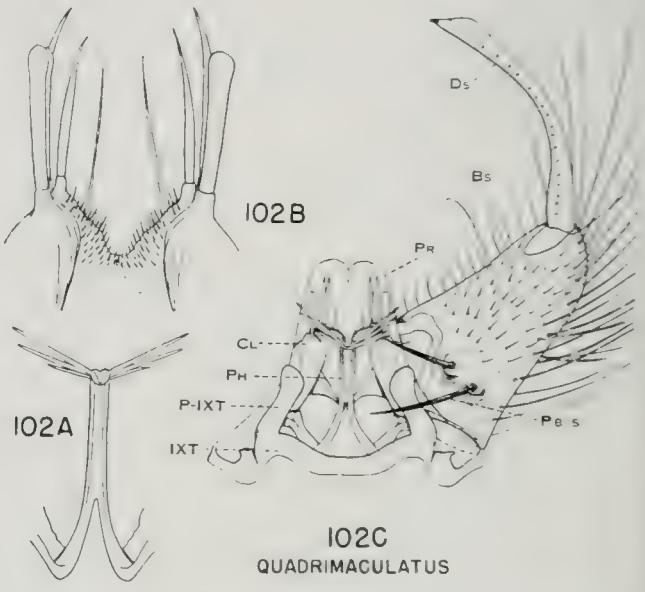


FIG. 101–102.—*Anopheles*, male genitalia: *A*, phallosome; *B*, claspettes; *C*, ventral aspect of entire structure. Abbreviations; D-L, dorsal lobe of claspette; V-L, ventral lobe of claspette; BS, basistyle; CL, claspette; DS, dististyle; IXT, ninth tergite; PB-S, parabasal spine; PH, phallosome; P-IXT, process of ninth tergite; PR, proctiger. (After Ross & Roberts 1943.)

27. Claspette with base of filament sharply bent so that most of the filament forms a right angle with the stem (Fig. 99*C*) ..... **communis**

Claspette with base of filament not bent, the filament forming an obtuse angle with the stem (Fig. 94*C*, 96*C*) 28

28. Basal lobe with abundant long hairs which form a thick brush (Fig. 94*D*); apical lobe with a few long hairs on mesal face (Fig. 94) ..... **fitchi**

Basal lobe with sparse and moderately short hairs; apical lobe with abundant hairs on mesal face (Fig. 96) ..... **punctor**

Key to Species of ANOPHELES (Males)

1. Wing with 1 or more bars of white or yellowish white scales along anterior margin and anal vein (Fig. 59, 60) 2

Wing without any pale patches, all scales dark (Fig. 61) except sometimes apical fringe scales..... 3

2. Anal vein with 3 short dark bars separated by white

4. Palp black but with rings of white scales at joints (Fig. 62) ..... **walkeri**

Palp entirely black and without white rings (Fig. 61) 5

5. Phallosome without leaflets at apex (Fig. 101*A*); wing length under 3.5 mm..... **barberi**

Phallosome with a cluster of leaflets at apex (Fig. 102*A*); wing length over 3.5 mm..... **quadrimaculatus**

Key to Species of CULEX (Males)

1. Basistyle globular and short; subapical lobe, *c*, divided into two or three individual long stalks (Fig. 110*A*, 111*A*) 2

Basistyle elongate, tapering at apex; subapical lobe, *c*, only slightly, if at all, subdivided (Fig. 103*A*, 105*A*, 109*A*) 3

2. Dististyle narrow and only slightly curved; subapical lobe, *c*, with upper stalk slender, leaflet regular in shape and of moderate size (Fig. 111*A*)..**erraticus**

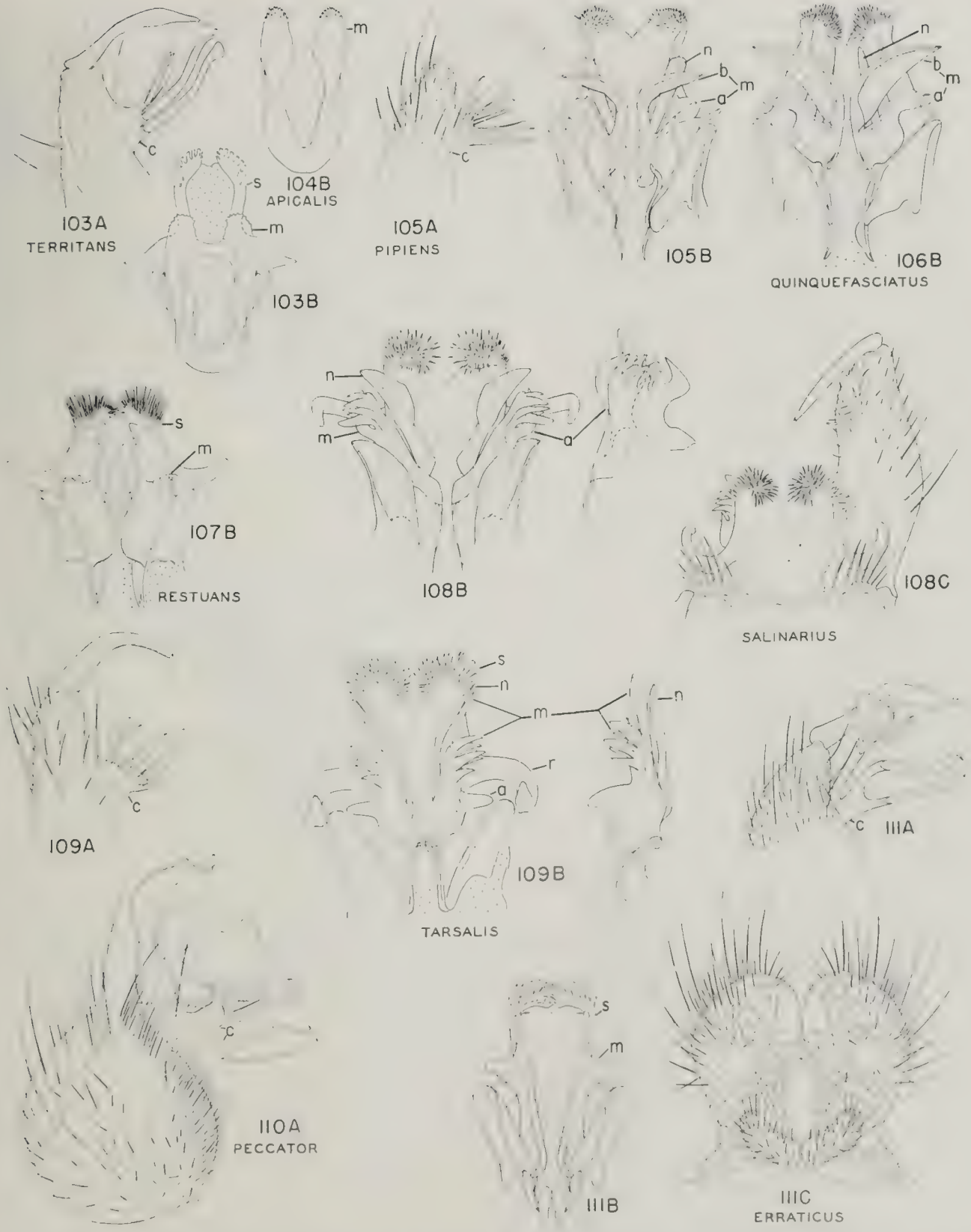


FIG. 103–111.—*Culex*, male genitalia: *A*, claspers, lateral aspect; *B*, phallosomal structures, dorsal aspect; *C*, ventral view of capsule. Abbreviations: *a* and *b*, as in key; *c*, subapical lobe; *m*, middle and, *n*, inner phallosomal plates; *r*, basal arm of tenth sternite; *s*, apex of tenth sternite.

Dististyle wider and fairly sharply curved; subapical lobe, *c*, with upper stalk stout, leaflet very large and with irregular outline (Fig. 110*A*) .... peccator

3. Middle phallosomal plate, *m*, armed with a cluster of stout sclerotized teeth (Fig. 108*B*, 109*B*) 4
   Middle phallosomal plate, *m*, not toothed (Fig. 103*B*–107*B*) 5
4. Lateral arm of inner phallosomal plate, *n*, with apical half expanded; middle plate, *m*, with basal projection, *a*, curved back and up under teeth (Fig. 108*B*) and without a ventral blade paralleling inner plate ..... salinarius
   Lateral arm of inner phallosomal plate, *n*, narrow and bladelike, apex curved laterad and paralleled by a ventral blade of middle plate, *m*; middle plate with basal projection, *a*, projecting only laterad (Fig. 109*B*) ..... tarsalis
5. Inner and middle phallosomal plates not separate from each other, together represented by a single structure, *m* (Fig. 103*B*, 107*B*) 6
   Inner phallosomal plate, *n*, forming a V- or U-shaped structure; middle phallosomal plate, *m*, well developed, each arm terminating in a sickle-shaped process, *b* (Fig. 105*B*, 106*B*) 7
6. Middle phallosomal plate, *m*, with apexes forming a pair of stout rods curved laterally at their tips (Fig. 107*B*); brush of tenth sternite, *s*, bushy... restuans
   Middle phallosomal plate, *m*, with apexes forming a pair of round serrate lobes, the two forming a sclerotized oval; brush of tenth sternite, *s*, comblike (Fig. 103*B*) ..... territans*
7. Rods of inner phallosomal plate, *n*, divergent, together forming a V-shaped structure (Fig. 105*B*) .... pipiens
   Rods of inner phallosomal plate, *n*, convergent, together forming a U-shaped structure (Fig. 106*B*) .... quinquefasciatus

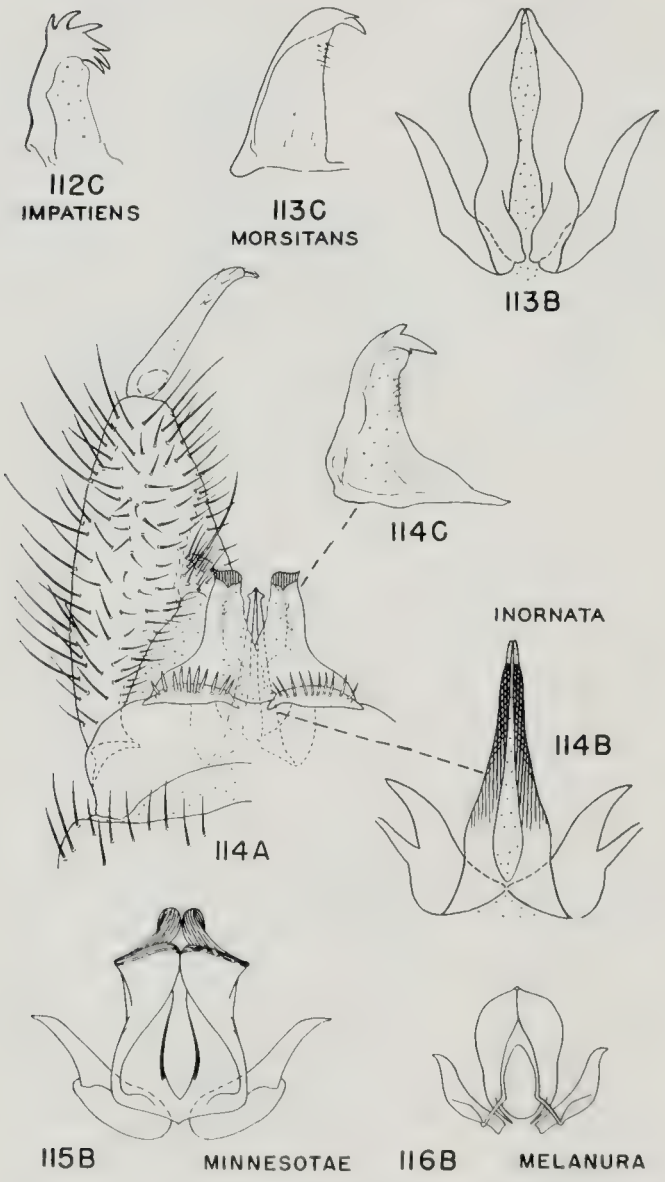


FIG. 112–116.—*Culiseta*, male genitalia: *A*, genital capsule, ventral aspect; *B*, phallosome, dorsal aspect; *C*, lobe of tenth sternite, lateral aspect.

Key to Species of CULISETA (Males)

1. Phallosome consisting of a pair of long slender black rods tipped with a small membranous piece (Fig. 114*B*) ..... inornata
   Phallosome wide and bulbous and only lightly sclerotized (Fig. 113*B*, 116*B*) 2
2. Phallosome somewhat quadrate, its lateral margins angulate near apex (Fig. 115*B*) ..... minnesotae
   Phallosome ovate, its lateral margins sinuate or rounded (Fig. 113*B*, 116*B*) 3
3. Phallosome rather 8-shaped, the basal swelling at least as broad as the apical one (Fig. 113*B*); large individuals .... morsitans
   Phallosome broadly oval, broadest just before apex (Fig. 116); small individuals ..... melanura

Key to Species of ORTHOPODOMYIA (Males)

Two species of this genus, *alba* and *signifera*, have been found in Illinois, but the two species can be identified to date only in the larval stage. They are rarely collected in light traps. Neither bites man.

Key to Species of PSOROPHORA (Males)

1. Dististyle with a large mesal lobe and a long mesal spurlike projection (Fig. 118) ..... howardi
   Dististyle without mesal processes 2
2. Dististyle with tip truncate; apical spur situated before apex (Fig. 120) ..... varipes
   Dististyle with tip round or tapered and small; apical spur situated at end (Fig. 119) 3

* Formerly listed as *Culex apicalis* Adams, a western species in which the arms of the phallosome are not joined by an apical bridge (Fig. 104*B*), as is the case in *Culex territans* (Fig. 103*B*).

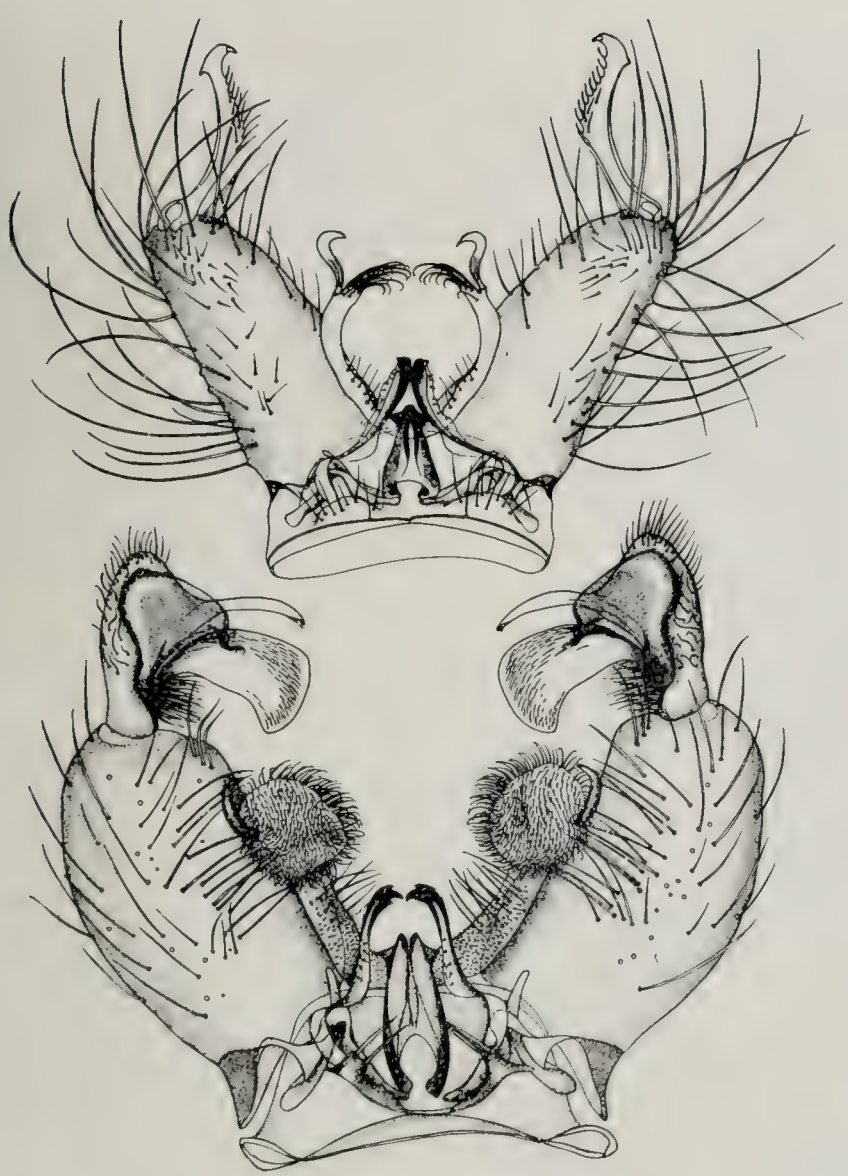


FIG. 117 (upper).—*Psorophora ciliata*, male genitalia. (After Matheson 1944.)

FIG. 118 (lower).—*Psorophora howardi*, male genitalia. (After Matheson 1944.)

3. Dististyle narrow and sinuate, with a mesal row of bristles (Fig. 117) ..... **ciliata**
   Dististyle expanded near or beyond middle, without mesal row of bristles (Fig. 119) 4
4. Apical portion of claspette having two long slender filaments, each tipped with a long curved spine (Fig. 124) ..... **longipalpis**
   Apical portion of claspette without such filaments (Fig. 121, 122) 5
5. Apex of claspette with a series of simple setae or hairs and two flattened contorted leaflets at lateral corner (Fig. 123) 6
   Apex of claspette without contorted leaflets, at most with scales and thickened hairs (Fig. 119, 121) 7
6. Mesonotum golden scaled over its entire area ..... **ferox**
   Mesonotum with mesal half black scaled, lateral portions white scaled, the two colors forming longitudinal bands ..... **horrida**
7. Apex of claspette with a dense series of hairs and scales (Fig. 119) ..... **cyanescens**
   Apex of claspette with a series of only 4 to 8 long thickened hairs (Fig. 121, 122) 8
8. Apex of claspette with 5 to 8 thickened hairs (Fig. 121) ..... **confinnis**
   Apex of claspette with 4 or 5 thickened hairs (Fig. 122) ..... **discolor**

KEYS TO CULICIDAE LARVAE

The chief parts named in these keys are illustrated in Fig. 125 and 126; other parts are included in the diagnostic drawings illustrating the couplets. The mouth brushes are omitted from head drawings except Fig. 129*B*. In drawings of the air tube, except Fig. 165*A*, 169*A*, and 172*A*, ventral tufts are shown for only one side.

FIG. 119 (upper left).—*Psorophora cyanescens*, male genitalia. (After Matheson 1944.)

FIG. 120 (upper right).—*Psorophora varipes*, male genitalia. (After Matheson 1944.)

FIG. 121 (lower left).—*Psorophora confinnis*, male genitalia. (After Matheson 1944.)

FIG. 122 (lower right).—*Psorophora discolor*, male genitalia. (After Matheson 1944.)

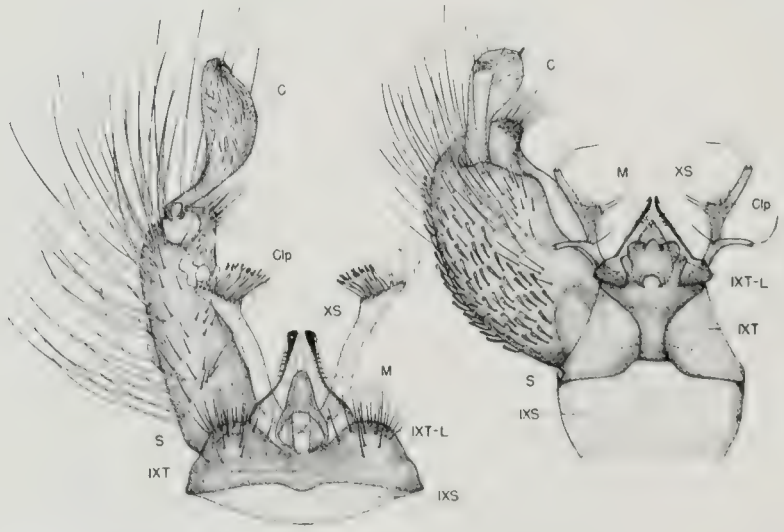


FIG. 123 (left).—*Psorophora horrida*, male genitalia. (After Roth 1945.)

FIG. 124 (right).—*Psorophora longipalpis*, male genitalia. (After Roth 1945.) Abbreviations: *C*, dististyle; *Clp*, claspette; *M*, mesosome; *S*, basistyle; *IXT*, ninth tergite; *IXT-L*, lateral lobe of ninth tergite; *IXS*, ninth sternite; *XS*, tenth sternite.

Key to Genera of CULICIDAE (Larvae)

1. Eighth segment with a flat spiracular plate, but no air tube (Fig. 126) ..... **Anopheles**

Eighth segment with an air tube (Fig. 125) 2

2. Air tube short, with some of its sclerites at the apex forming long stout spurlike processes (Fig. 128*A*,

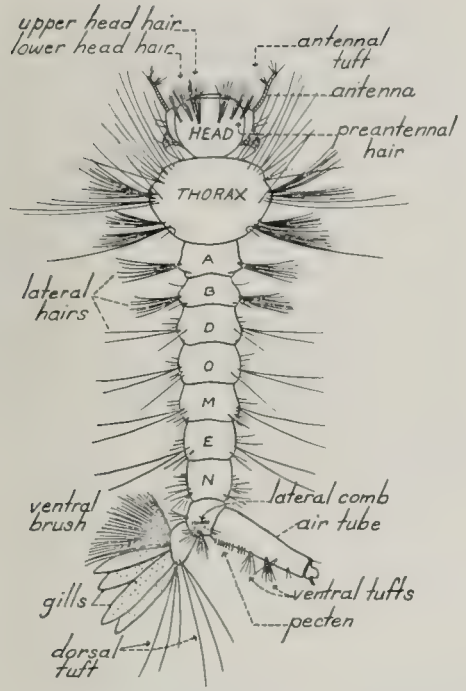


FIG. 125—Larval diagram, Culicinae. (After King, Bradley, & McNeel 1939.)

132). Found attached by its air tube to roots of succulent vegetation in marshes with soft bottom; seldom seen at surface.....**Mansonia perturbans**

Air tube without apical stout spurlike processes, its apical sclerites flat or conical (Fig. 127*A*, 129*A*) 3

3. Ventral brush of anal segment represented by only a single pair of double (Fig. 130*A*) or triple hairs. Found only in the liquid inside the bladder-like leaves of pitcher plants.....**Wyeomyia smithi**

Ventral brush of anal segment consisting of several tufts of hairs (Fig. 127*A*, 129*A*).....4

4. Anal segment with sclerotized plate not meeting on ventral surface (Fig. 140*A*, 141*A*).....**Aedes**

Anal segment completely ringed by sclerotized plate (Fig. 127*A*) 5

5. Air tube cylindrical and without a pecten (Fig. 127*A*, 129*A*) 6

Air tube either greatly swollen (Fig. 176) or with a pecten (Fig. 145*A*, 165*A*) 7

6. Abdominal segments 3–7 each with 3 spine-bearing sclerous plates on each side (as on segment 7, Fig. 129*A*); head quadrate, with most of dorsal hairs single, and with hairs of mouth brushes coarse (Fig. 129*B*). Occurring in tree holes; predacious on

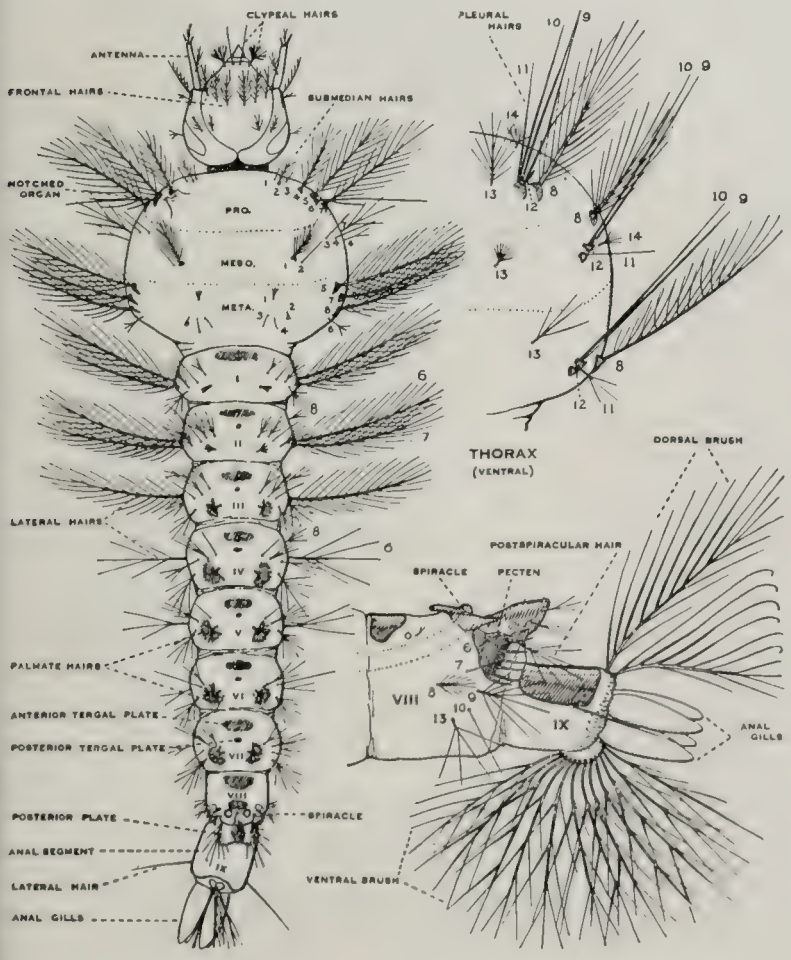
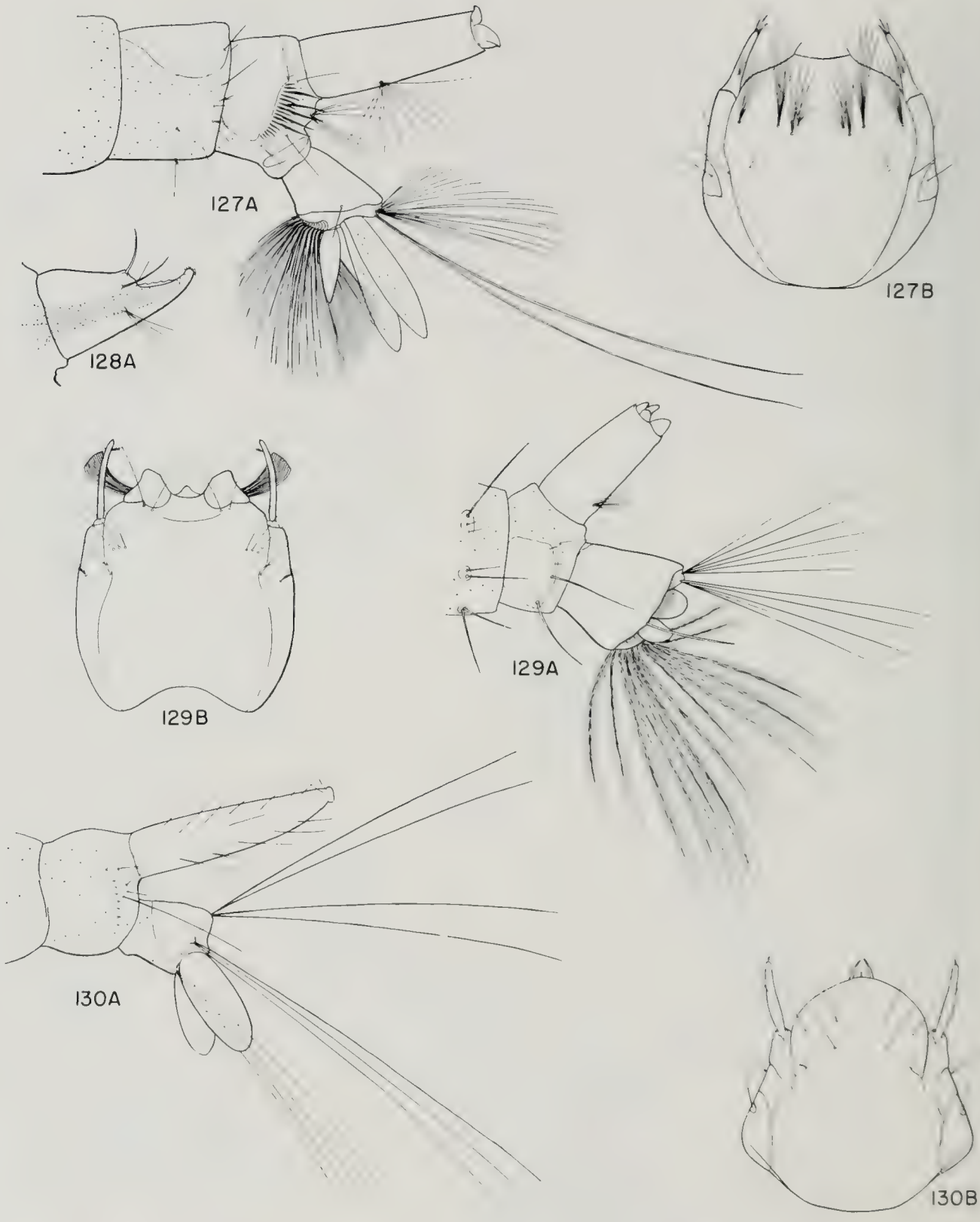


FIG. 126.—*Anopheles* larva. Left figure, dorsal view of entire larva; upper right figure, details of thorax; lower right figure, apex of abdomen, lateral aspect. (After Ross & Roberts 1943.)



Larval parts: *A*, apex of abdomen; *B*, dorsum of head.

FIG. 127.—*Orthopodomyia signifera.*

FIG. 128.—*Mansonia perturbans* (the air tube only). (After King, Bradley, & McNeel 1939.)

FIG. 129.—*Toxorhynchites rutilus septentrionalis.*

FIG. 130.—*Wyeomyia smithi.* (Ventral brush reduced to only 4 long hairs.)

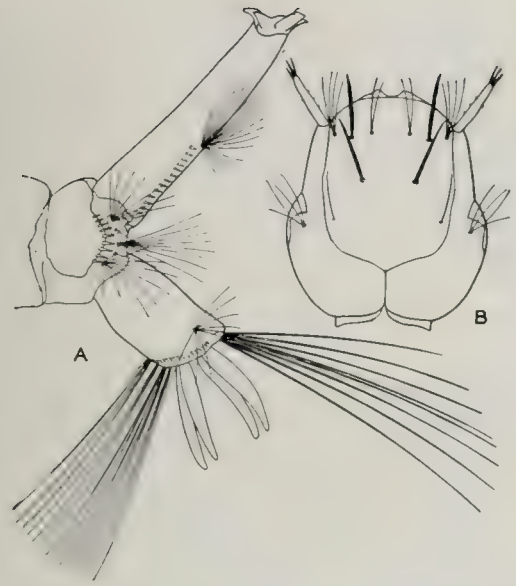


FIG. 131.—*Uranotaenia sapphirina*, larva. *A*, apex of abdomen, lateral aspect; *B*, dorsum of head.

other mosquito larvae.....
.....**Toxorhynchites rutilus septentrionalis**

Abdominal segments 3–7 without lateral spine-bearing sclerous plates (Fig. 127*A*), sometimes segments 6 and 7 each with dorsal saddle; head oval, with most of the dorsal hairs multiple (Fig. 127*B*) and with hairs of mouth brushes fine.....
..... **Orthopodomyia**

7. Teeth of lateral comb situated on the posterior margin of a large sclerous plate that covers most of each side of the eighth segment (Fig. 131*A*); head with 4 stout black spines situated dorsally (Fig. 131*B*). Lives among emergent plants in permanent shallow water.....**Uranotaenia sapphirina**

Teeth of lateral comb either on a small poorly defined plate (Fig. 173*A*), or not on a plate; head with slender hairs situated dorsally (Fig. 173*B*).....8

8. Head with anterior portion square and with short antenna not reaching beyond front margin of head (Fig. 175*B*) .....**Psorophora**

Head either with anterior portion rounded (Fig. 174*B*), or antenna extending far beyond front margin of head (Fig. 177) 9

9. Air tube having a branched hair on each side at its base (Fig. 170*A*–172*A*).....**Culiseta**

Air tube having no branched hair at its base (Fig. 135*A*, 163*A*) 10

10. Air tube with several single or branched hairs on each side (Fig. 163*A*–168*A*).....**Culex**

Air tube with only one single or branched hair on each side (Fig. 143*A*, 173*A*), or with none.....11

11. Ventral brush of anal segment having several tufts that arise out of the ventral midline of the sclerous ring (Fig. 173*A*–174*A*).....**Psorophora**

Ventral brush of anal segment with all tufts posterior to sclerous ring (Fig. 143*A*).....**Aedes**

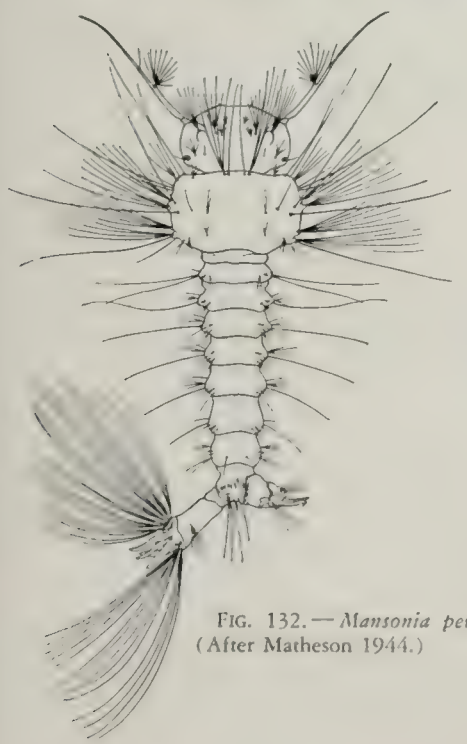


FIG. 132.—*Mansonia perturbans*, larva. (After Matheson 1944.)

Key to Species of AEDES (Larvae)

1. Anal segment completely ringed by sclerous plate (Fig. 133*A*) 2

Anal segment with sclerous plate not meeting below, frequently forming only a dorsal saddle (Fig. 136*A*) 12

2. Pecten extending beyond ventral tuft on air tube (Fig. 133*A*) 3

Ventral tuft situated beyond end of pecten on air tube (Fig. 135*A*) 4

3. Lateral comb consisting of an irregular single row of 9 to 14 scales, each scale having a long apical point, as in Fig. 138*A*; all teeth of pecten forming an even, closely spaced row (not as in Fig. 138*A*). Occurs during summer in temporary woodland pools .....**tormentor**

Lateral comb consisting of a triangular patch of 25 or more scales, each scale fairly evenly feathered around apex; apical tooth of pecten situated some distance from the remainder of the row (Fig. 133*A*). Occurs during summer in temporary pools.....
.....**fulvus pallens**

4. Gills budlike, much shorter than anal segment (Fig. 135*A*). Occurs in summer in pools containing sulfur compounds .....**sollicitans**

Gills at least as long as anal segment (Fig. 136*A*), frequently very long and each pointed at tip (Fig. 138*A*) 5

5. Gills with prominent tracheae and extremely long, about 10 times length of anal segment (Fig. 148*A*); lateral comb with only a few scales. Occurs during

summer in temporary heavily shaded woodland pools; larvae seldom come to surface.....**dupreei**

Gills without tracheae and much shorter than gills in Fig. 148*A*, at most 3 or 4 times length of anal segment (Fig. 138*A*); lateral comb with few to many scales 6

6. Dorsal tuft at apex of anal segment represented by two pairs of long strong hairs (Fig. 143*A*). Occurs in spring in woodland and bog pools...**abserratus**

Dorsal tuft at apex of anal segment with upper pair of hairs many-branched and fanlike, lower pair single, long, and strong (Fig. 144*A*).....7

7. Pecten with several widely detached teeth, exemplified in Fig. 138*A*, and extending along two-thirds the length of the air tube; ventral tuft situated close to apex of air tube, more than three-quarters of the distance from the base of air tube. Occurs during summer in unshaded and usually alkaline ponds... ..... **nigromaculis**

Pecten without detached teeth and not extending so far along air tube (Fig. 145*A*); ventral tuft situated either midway along air tube or only two-thirds distance from its base.....8

8. Lateral comb having only 4 to 6 scales; gills 3 or 4 times length of anal segment. Occurs during summer in temporary woodland pools.....**atlanticus**

Lateral comb having 10 scales or more; gills ranging from 1 to 4 times length of anal segment.....9

9. Gills 3 to 4 times as long as anal segment; air tube thick, its length about 2.5 times its depth near middle (Fig. 145*A*). Occurs during late spring and summer, especially in temporary woodland pools ..... **trivittatus**

Gills only 1 to 1.5 times as long as anal segment; air tube slightly more slender than that in Fig. 145*A*, its length equal to or exceeding 2.5 times its depth near middle 10

10. Ventral tuft of air tube situated midway along length of tube and composed of only 3 to 5 hairs (Fig. 151). Occurs during spring in cold forest pools and bogs .....**punctor**

Ventral tuft of air tube situated beyond middle of tube and composed of 6 or more hairs (Fig. 152) 11

11. Ventral tuft of air tube situated nearly as close to the last tooth of pecten as that tooth is to the preceding tooth; air tube at most 2.5 times as long as its depth near middle (Fig. 154). Occurs in temporary ground pools.....**infirmatus**

Ventral tuft of air tube situated beyond the last tooth of pecten as far as shown in Fig. 152; air tube 3 or more times as long as its depth near middle. Occurs during summer in temporary ground pools .....**mitchellae**

12. Dorsal head hair 7, at base of antenna, delicate and single (Fig. 149*B*); anal segment with upper hair of dorsal tuft only 2- or 3-branched, but nearly as long as lower single hair (Fig. 149*A*). An introduced species that may occur during summer in domestic containers around habitations; rare in Illinois .....**aegypti**

Dorsal head hair 7 divided into a 4- to 15-branched tuft (Fig. 150*B*); anal segment with upper hair of dorsal tuft 5- to 15-branched and much shorter than lower single hair (Fig. 150*A*) 13

13. Pecten with one or more apical teeth spaced fairly far from the nearest, appearing detached from row (Fig. 138*A*) 14

Pecten with all teeth close together and forming an even row (Fig. 136*A*).....22

14. Air tube with pecten extending beyond ventral tuft (Fig. 153).....15

Air tube with ventral tuft situated beyond pecten (Fig. 138*A*) 16

15. Air tube with about 8 hair tufts on each side above level of pecten (Fig. 153); lateral comb consisting of 14 to 16 scales, each scale having a long apical spine, as in Fig. 139*A*. Occurs during spring in grassy swales in light shade.....**trichurus**

Air tube with no hair tufts other than ventral tuft; lateral comb consisting of 20 to 60 scales, each scale fairly evenly feathered, as in Fig. 141*A*. Occurs during summer in rain-filled rock holes..... ..... **smithii palpus**

16. Head hair 6 considerably to the side of, and only slightly anterior to, head hair 5 (Fig. 137*B*).....17

Head hair 6 only slightly to the side of, but considerably anterior to, head hair 5 (Fig. 139*B*).....18

17. Antenna fairly thick at base and long, tuft beyond middle (Fig. 137*B*); head hairs 5 and 6 double, occasionally 1 of the 4 head hairs triple; clypeal bristles moderately far apart. Occurs during spring in woodland pools and bogs.....**aurifer**

Antenna not enlarged at base, tuft below middle (Fig. 138*B*); head hairs 5 and 6 triple to multiple, at least 2 of the 4 head hairs with 4 to 6 branches; clypeal bristles much closer together than in *aurifer*. Occurs during spring in woodland pools, bogs, and marshes .....**cinereus**

18. Air tube 5 times as long as its depth at middle of pecten, its ventral tuft very long (Fig. 140*A*). Occurs during spring in temporary woodland pools and bogs .....**excrucians**

Air tube not more than 4 times as long as its depth at middle of pecten, its ventral tuft frequently short (Fig. 139*A*) 19

19. Head hairs 5 and 6 single; anal segment with only 1 or 2 tufts anterior to ventral barred area at apex (Fig. 147*B*). Occurs during spring in temporary pools ..... **spenceri**

Head hairs 5 or 6, or both, double to quadruple; anal segment with 3 or more tufts anterior to barred area (Fig. 139*A*).....20

20. Lateral comb consisting of 10 to 15 scales in an irregular single or double row (Fig. 139*A*). Occurs from spring to fall in temporary pools .....**vexans**

Lateral comb consisting of more than 20 scales in a triangular patch 21

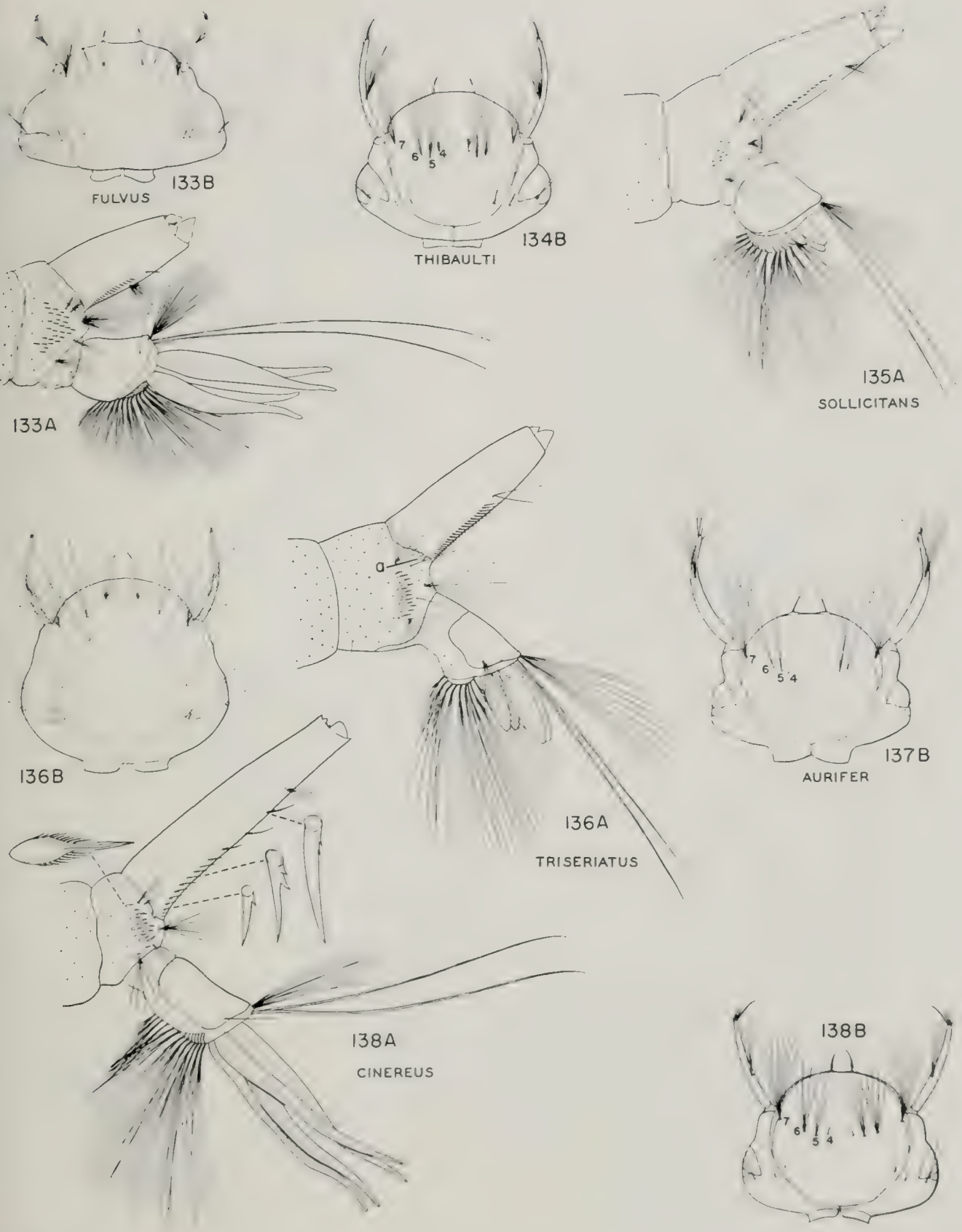


FIG. 133–138.—*Aedes* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head. Details of pecten and comb scales are shown in Fig. 138*A*.

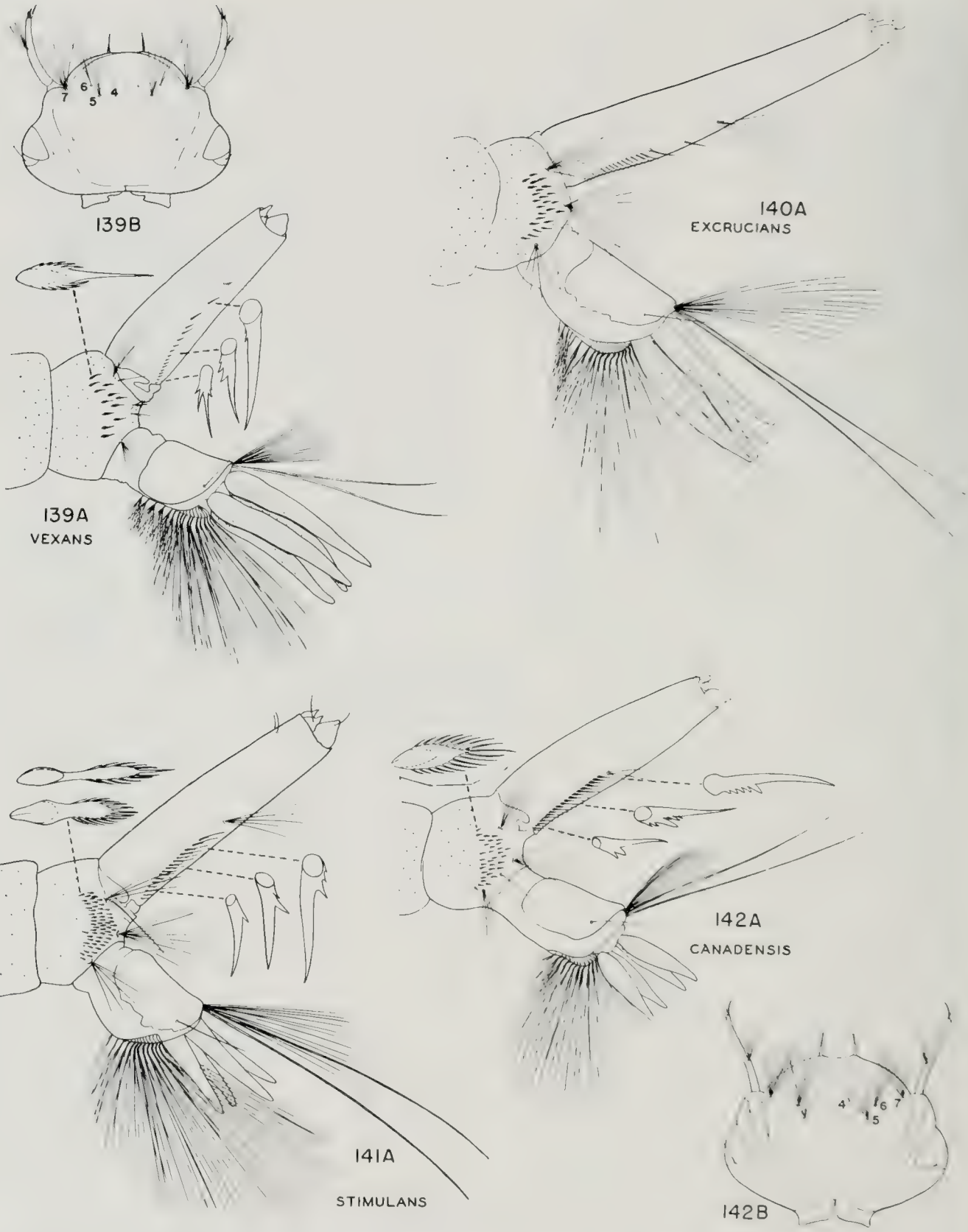


FIG. 139–142.—*Aedes* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head. Details of pecten and comb scales are shown in Fig. 139*A*, 141*A*, and 142*A*.

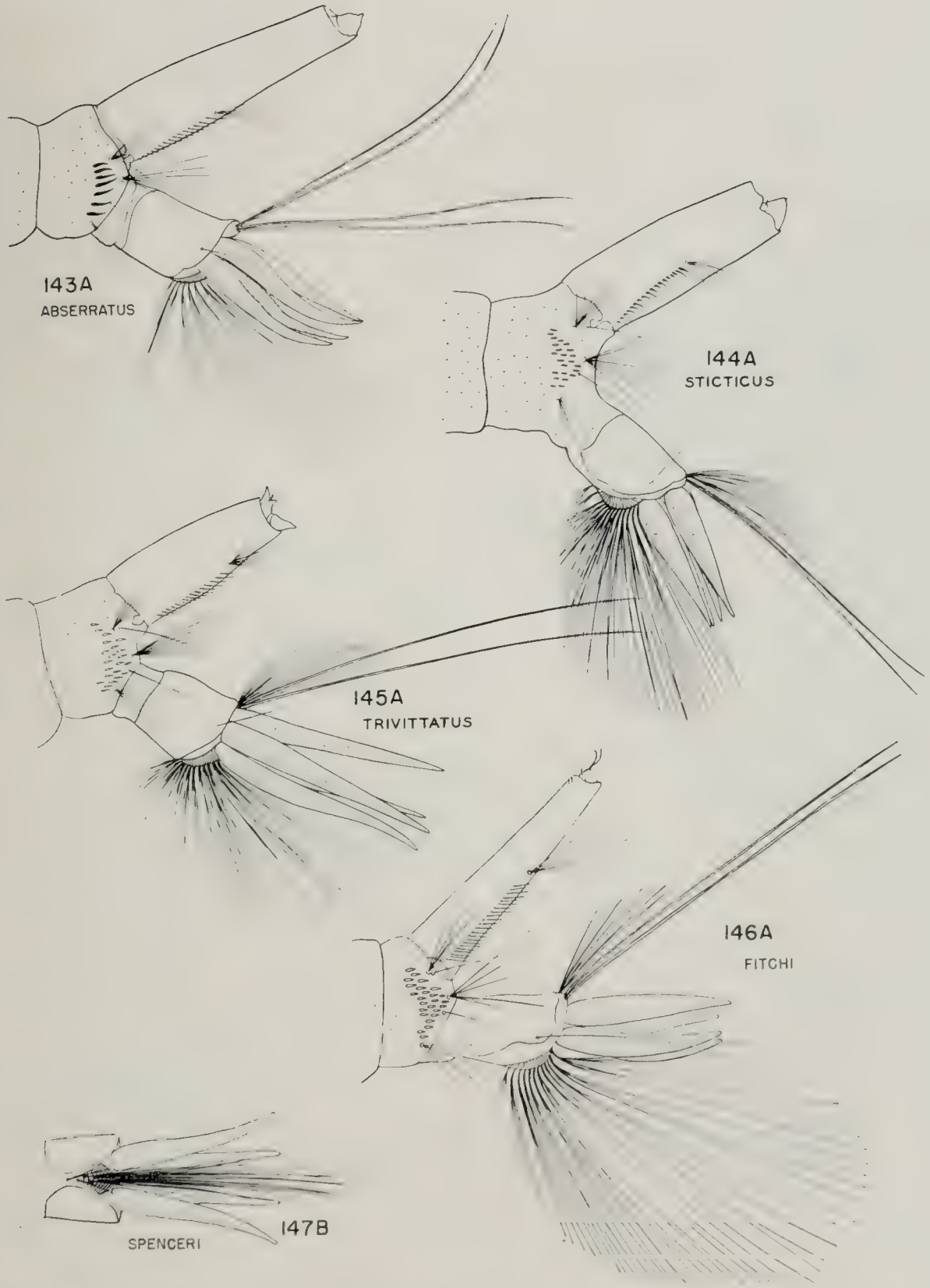


FIG. 143–147.—*Aedes* larvae: *A*, apex of abdomen, lateral aspect; *B*, ventral aspect, showing anal hair tufts anterior to the barred area at base of gills.

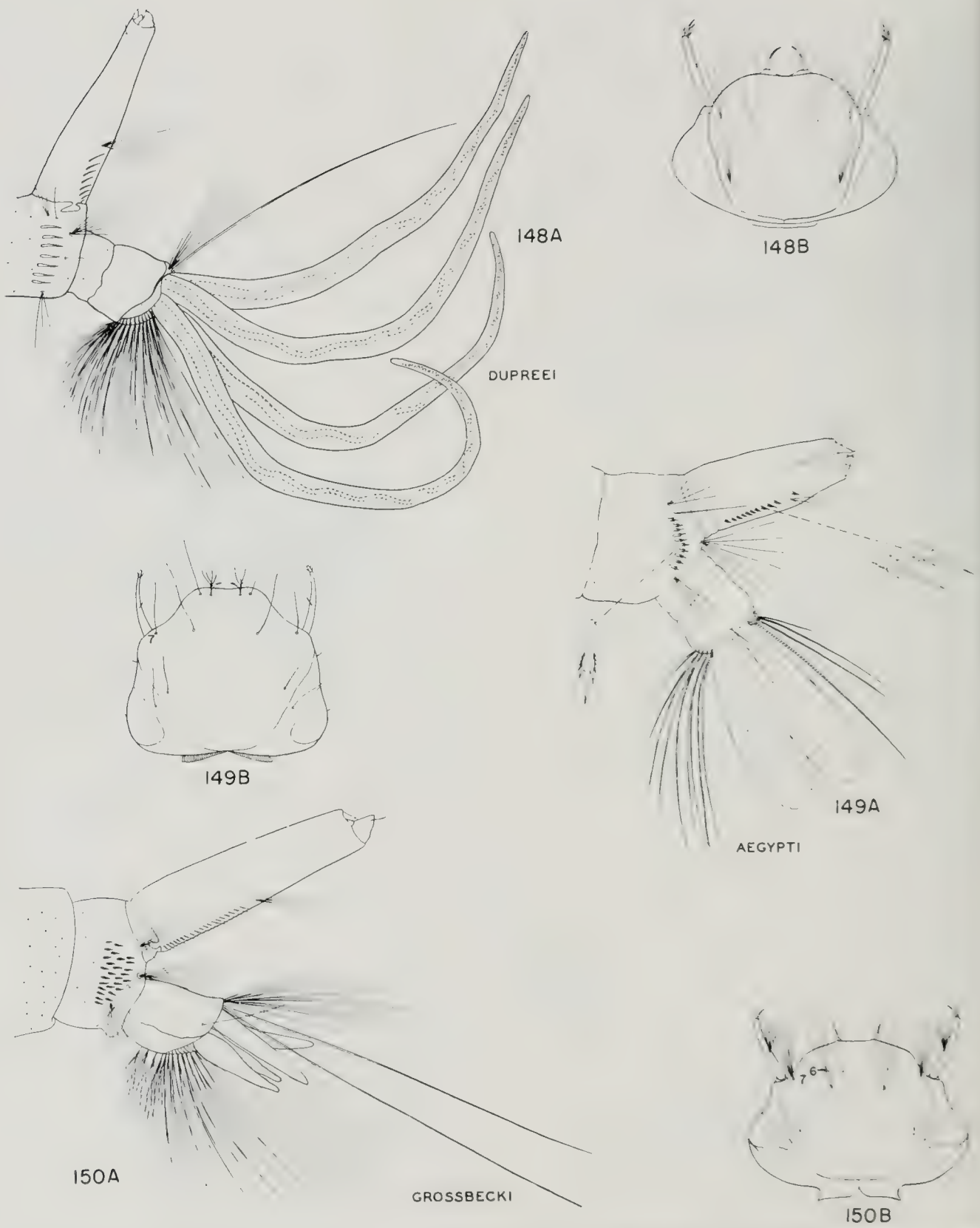


FIG. 148–150.—*Aedes* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head. Details of pecten and comb scales are shown in Fig. 149*A*. (Fig. 148 redrawn from Dyar 1928.)

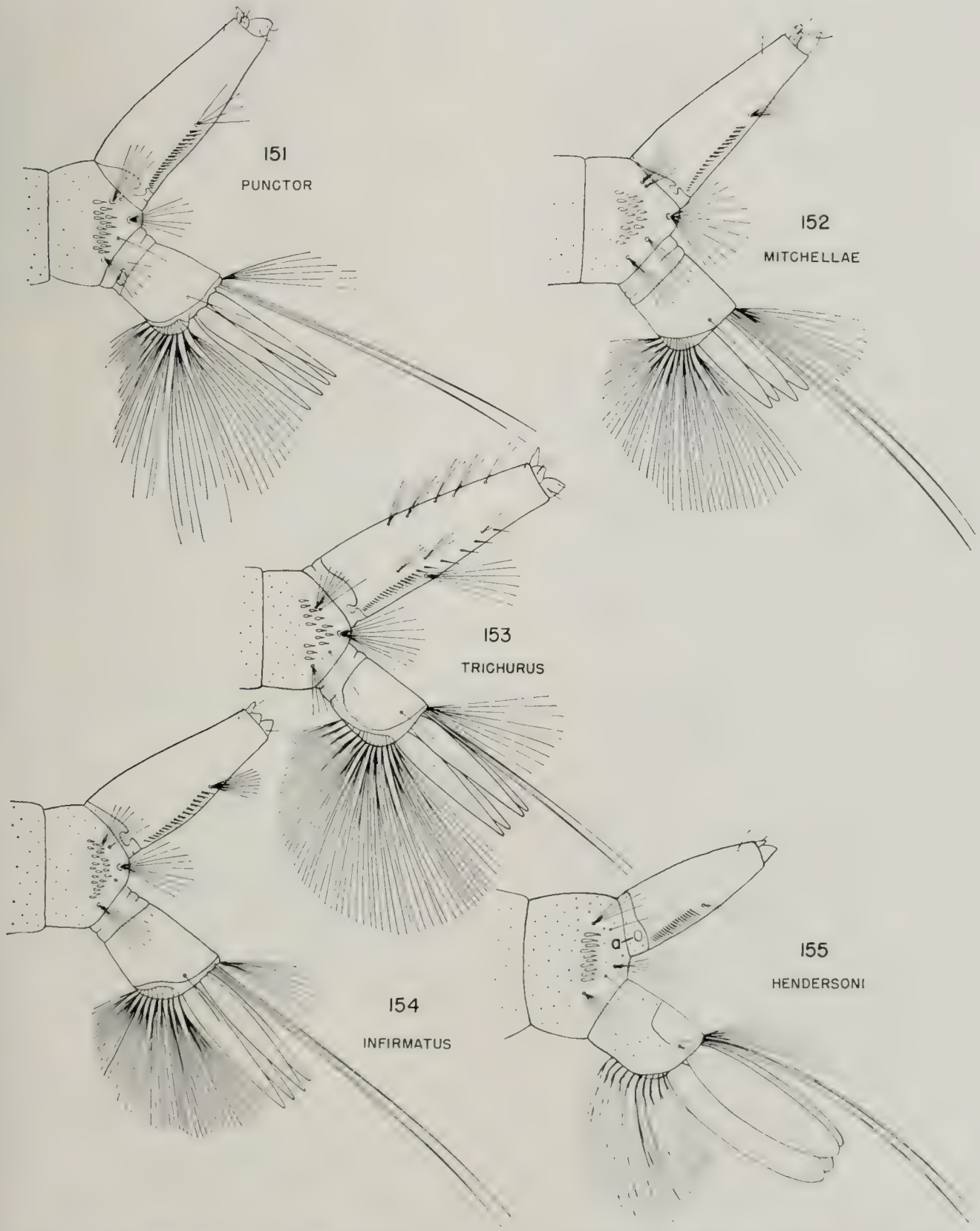


FIG. 151–155.—*Aedes* larvae: lateral aspect of abdomen. (Fig. 151–154 redrawn from Carpenter & LaCasse 1955; Fig. 155 redrawn from Breland 1960.)

21. Ventral tuft situated near middle of air tube, as in Fig. 141*A*. Occurs during spring in grassy temporary pools ..... **flavescens**

Ventral tuft situated two-thirds distance along air tube, as in Fig. 139*A*. Occurs during spring in temporary pools, especially those with fairly high alkalinity ..... **campestris**

22. Anal gills long (Fig. 136*A*), dorsal pair much longer than ventral pair. Occurs throughout the year in tree holes and shaded containers..... **triseriatus**

Anal gills either as short as in Fig. 135*A* or all 4 gills about the same length (Fig. 142*A*)..... 23

23. Acus, *a*, of air tube detached from tube (Fig. 155). Lives in tree holes..... **hendersoni**

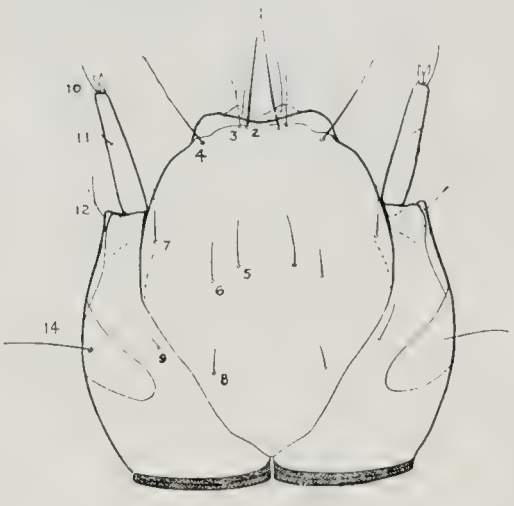
Acus, *a*, of air tube a connected part of the air tube (Fig. 136) 24

24. Head hair 5 with at least 5 branches and about the same size as head hair 7 (Fig. 142*B*); the 2 head hairs 5 closer together than the 2 head hairs 6....25

Head hair 5 with 4 branches or less; or the 2 head hairs 5 no closer together than the 2 head hairs 6 26

25. Head hair 5 some distance posterior to head hairs 4 and 6 (Fig. 142*B*); clypeal hairs only as far apart as the length of 1 hair. Occurs during spring chiefly in woodland pools..... **canadensis**

Head hair 5 only slightly posterior to head hairs 4 and 6 (Fig. 134*B*); clypeal hairs farther apart than the length of 1 hair. Occurs during spring in the hollow bases of tupelo gum trees..... **thibaulti**



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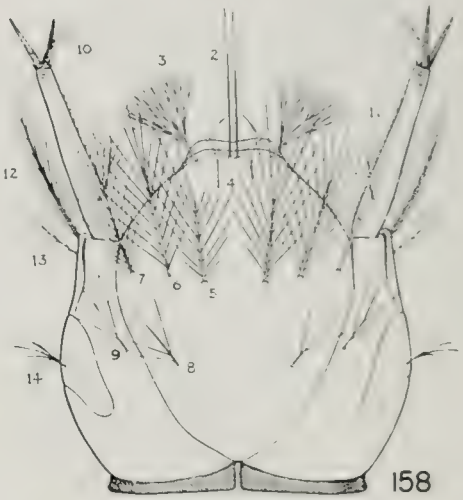

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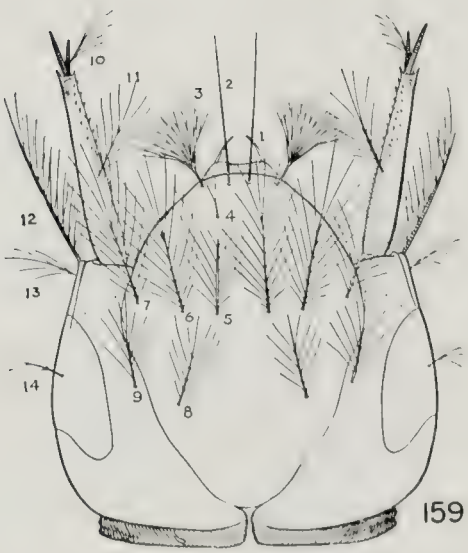

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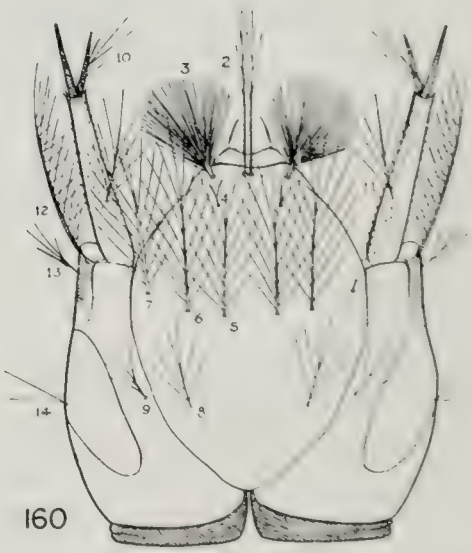


160

Heads of *Anopheles* larvae. Hair numerals used on this plate are those currently employed in the taxonomic literature on mosquitoes.

FIG. 156.—*A. barberi*. (After Ross & Roberts 1943.)

FIG. 157.—*A. earlei* (inner clypeal hairs only).

FIG. 158.—*A. punctipennis*. (After Ross & Roberts 1943.)

FIG. 159.—*A. quadrimaculatus*. (After Ross & Roberts 1943.)

FIG. 160.—*A. walkeri*. (After Ross & Roberts 1943.)

26. Air tube 5 times as long as its width at middle of pecten, tapering markedly, so that the width of the apex is about half the width of the base (Fig. 146*A*); its apical spine long and dark. Occurs during spring in marshes ..... **fitchi**

Air tube at most 4 times as long as its width at middle of pecten, tapering less than air tube in Fig. 146*A*, so that the width of the apex is about three-quarters the width of the base (Fig. 144*A*); its apical spine short and inconspicuous 27

27. Anal segment having 6 or more ventral tufts anterior to barred area, the tufts extending to the base of the sclerous saddle. Occurs during spring in grassy temporary pools ..... **flavescens**

Anal segment having at most 5 tufts anterior to barred area, the tufts extending only one-half to two-thirds the distance to the base of the sclerous saddle, as in Fig. 141*A* and 150*A*..... 28

28. Anal gills budlike, much shorter than the sclerous saddle, as in Fig. 135*A*. Occurs in summer in pools containing industrial wastes..... **dorsalis**

Anal gills as long as the sclerous saddle, not budlike (Fig. 144*A*) 29

29. Ventral tuft of air tube only about half as long as tuft posterior to lateral comb; sclerous saddle of anal segment only slightly longer than deep, extending more than three-quarters distance down sides of segment (Fig. 144*A*). Occurs during spring and early summer in woodland floodplain pools..... **sticticus**

Ventral tuft of air tube about as long as tuft posterior to lateral comb; sclerous saddle of anal segment much longer than deep, extending only one-half to two-thirds distance down sides of segment (Fig. 141*A*) 30

30. Lateral comb containing more than 40 scales. Occurs in spring in sphagnum pools..... **communis**

Lateral comb containing 40 scales or less..... 31

31. Head hair 6 usually double or single, occasionally triple; ventral tuft of air tube usually with 3 or 4 hairs (Fig. 141*A*). Occurs during spring in woodland pools in the northern half of Illinois..... **stimulans**

Head hair 6 usually double or triple (Fig. 150*B*), occasionally 4-branched; ventral tuft of air tube usually with 5 to 8 hairs (Fig. 150*A*). Occurs during spring in woodland pools in the southern fourth of Illinois ..... **grossbecki**

Key to Species of ANOPHELES (Larvae)

The larvae of the Illinois species of *Anopheles* live among emergent vegetation and flotage in permanent or semipermanent pools, the edges of lakes, and marshes, except for those of *barberi,* which live in tree holes.

1. Head hairs 5, 6, and 7 short and simple (Fig. 156); lateral body hairs with only short feathering..... **barberi**

Head hairs 5, 6, and 7 long and plumose (Fig. 158); lateral hairs of thorax and first 3 abdominal segments with long feathering (Fig. 162)..... 2

2. Fourth and fifth abdominal tergites with hairs 0 and 2 plumose (Fig. 162) ..... **crucians**

Fourth and fifth abdominal tergites either with hair 0 inconspicuous or with hair 2 only single or double (Fig. 161) 3

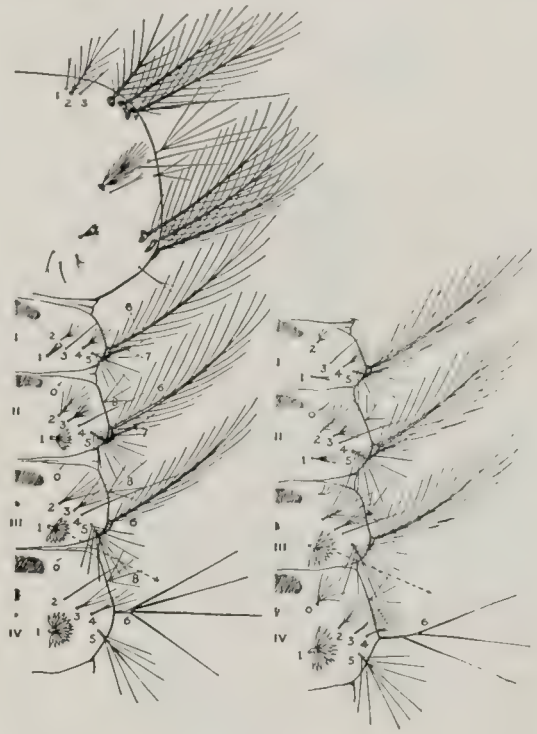


FIG. 161 (left).—*Anopheles quadrimaculatus,* larva, portion of dorsum. (After Ross & Roberts 1943.)

FIG. 162 (right).—*Anopheles crucians,* larva, portion of dorsum. (After Ross & Roberts 1943.)

3. Head hair 3 densely plumose, fan-shaped from base, with only an inconspicuous basal stalk (Fig. 160); head hair 2 sometimes feathered at tip; prothoracic hair 1 sometimes branched..... **walkeri**

Head hair 3 less densely plumose than that in Fig. 160, the fan-shaped portion having a long basal stalk (Fig. 159); head hair 2 never feathered at tip; prothoracic hair 1 rarely branched..... 4

4. Hair 1 of the second and following abdominal segments having each branch flattened, the whole hair appearing like a short, spread fan (Fig. 161)..... **quadrimaculatus**

Hair 1 of second abdominal segment with each branch nearly hairlike, as in Fig. 162; fanlike hairs beginning on third abdominal segment..... 5

5. Bases of the 2 head hairs 2 wide apart (Fig. 159).... **quadrimaculatus**

Bases of the 2 head hairs 2 close (Fig. 160)..... 6

6. Head hair 2 always simple (Fig. 158)..**punctipennis**

At least 1 of the 2 head hairs 2 usually with a conspicuous branch (Fig. 157)..... **earlei**

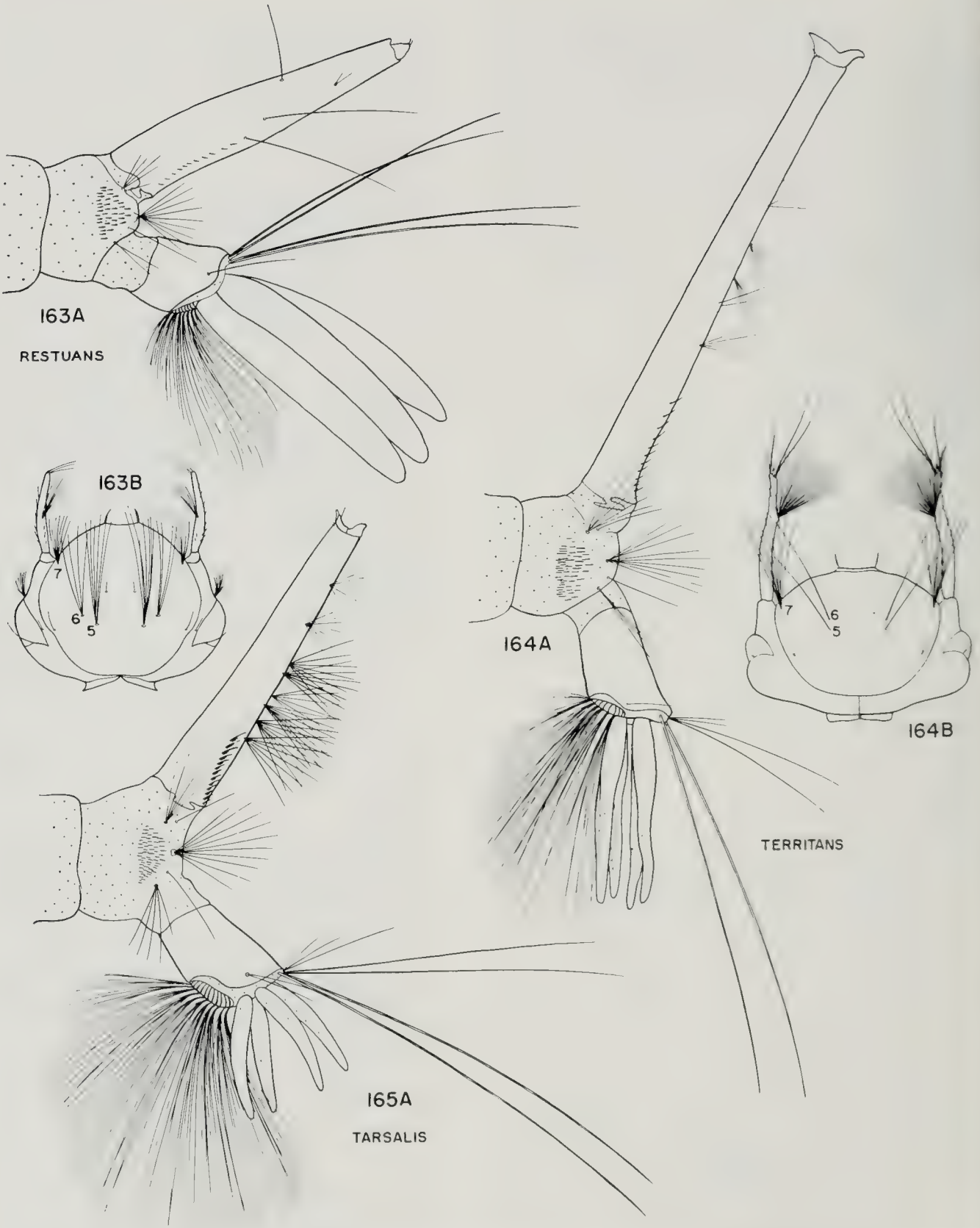


FIG. 163–165.—*Culex* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head. In Fig. 165*A*, ventral tufts are shown for both sides of air tube. In most other illustrations of air tube, ventral tufts of only one side are shown.

Key to Species of CULEX (Larvae)

Larvae of these species live all season among emergent plants in permanent ponds and pools, or in fish ponds, birdbaths, and other domestic containers.

1. Antennal tuft near middle (Fig. 163*B*) . . . . **restuans**
   Antennal tuft considerably past middle (Fig. 164*B*) . 2
2. Both of head hairs 5 and 6 long and single (Fig. 164*B*), or an occasional hair double . . . . . **territans**

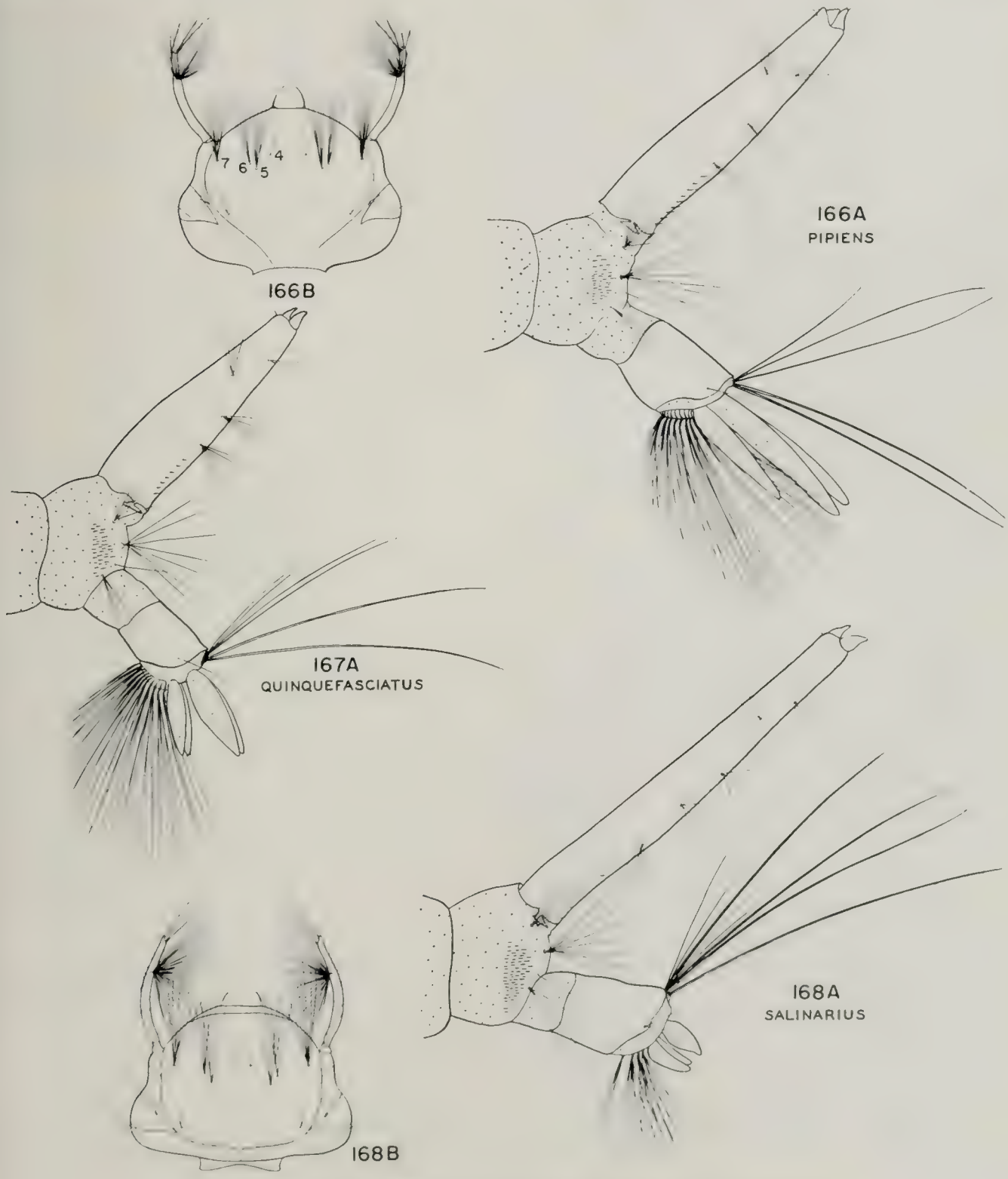


FIG. 166–168.—*Culex* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head.

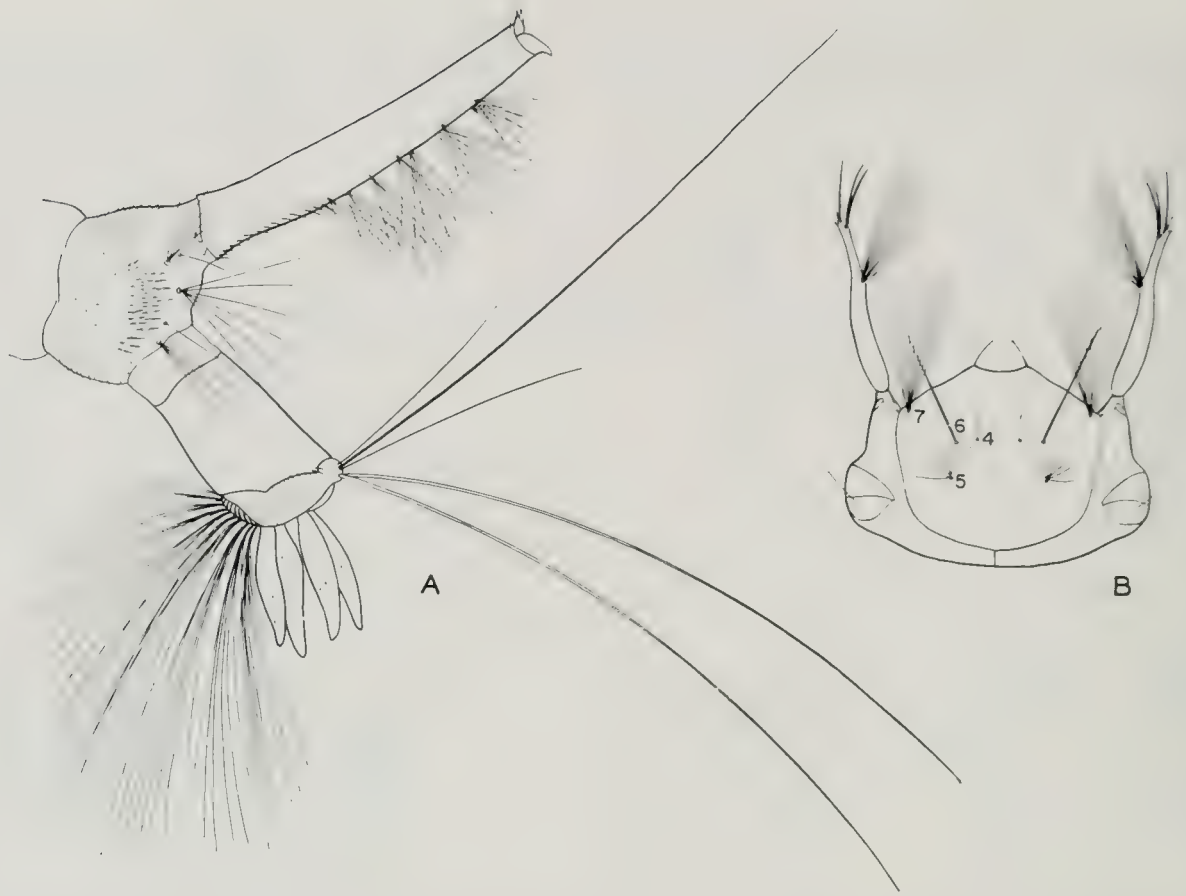


FIG. 169.—*Culex erraticus*, larva: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head. Ventral tufts are shown for both sides of the air tube.

One or both of head hairs 5 and 6 either multiple (Fig. 166*B*), or very short (Fig. 169*B*) 3

3. Head hair 6 long and single, head hair 5 short and double to multiple (Fig. 169*B*) 4

Head hair 6 triple to multiple, similar to head hair 5, both hairs long (Fig. 166*B*) 5

4. Lateral comb scales arranged in a loose cluster (Fig. 169*A*); head hair 5 with 4 or more branches (Fig. 169*B*); body having an almost velvety covering of minute spicules .....**erraticus**

Lateral comb scales more numerous than in Fig. 169*A* and forming a much more crowded cluster; head hair 5 double or triple; body having only a sparse covering of spicules .....**peccator**

5. Air tube very long and slender (Fig. 168*A*), 6 to 8 times as long as its width at end of pecten; tufts scattered and weak.....**salinarius**

Air tube either not more than 5 times as long as its width at end of pecten (Fig. 166*A*), or with strong clustered tufts (Fig. 165*A*) 6

6. Air tube usually 6 times as long as its width at end of pecten, sinuate but of almost uniform thickness throughout; with all tufts near ventral margin (Fig. 165*A*) .....**tarsalis**

Air tube usually 3.5 to 5 times as long as its width at end of pecten, somewhat vasiform, definitely thickest near end of pecten; with the penultimate tuft distinctly more dorsal than, and out of line with, the others (Fig. 166*A*) 7

7. Air tube 4 to 5 times as long as its width at end of pecten; 2 central hair tufts with a maximum of 3 or 4 brances each (Fig. 166*A*).....**pipiens**

Air tube less than 4 times as long as its width at end of pecten; 2 central hair tufts with 5 to 10 branches each (Fig. 167*A*).....**quinquefasciatus**

Specimens intermediate between these two conditions are probably hybrids .....
.....hybrid **pipiens** x **quinquefasciatus**

Key to Species of CULISETA (Larvae)

The larvae of this genus occur chiefly during spring in marshes having permanent water; occasionally they breed in stump holes and permanent ponds or pools.

1. Air tube with a row of about 12 hair tufts along ventral margin (Fig. 172*A*) .....**melanura**

Air tube with only a single ventral hair tuft on each side at or near base of tube (Fig. 171*A*).....2

2. Air tube short and stout; pecten consisting of about 10 basal sclerous teeth and, beyond these, a series of long fine single hairs (Fig. 170*A*)....**inornata**

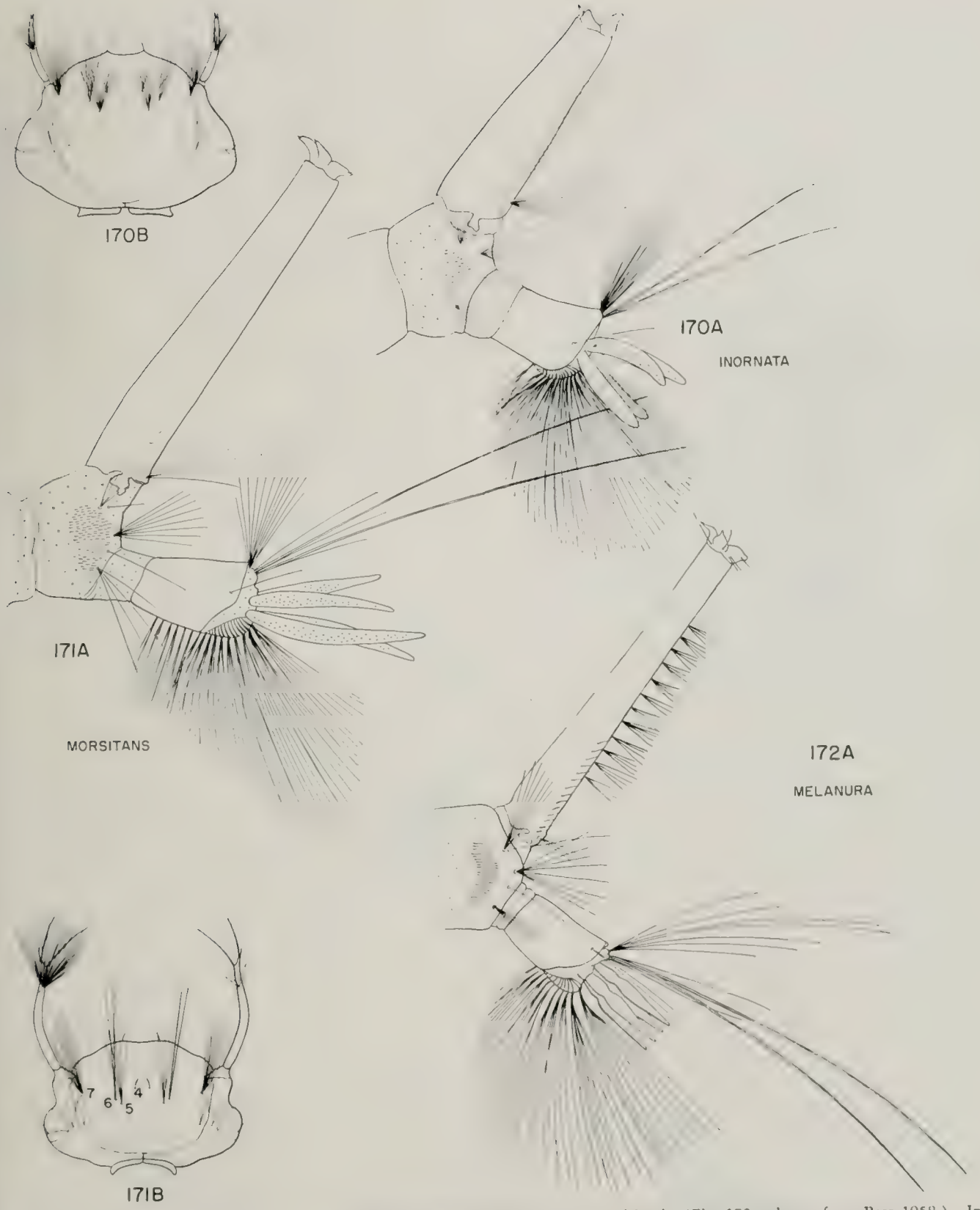


FIG. 170–172.—*Culiseta* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head. (Fig. 172 redrawn from Barr 1958.) In Fig. 172*A*, ventral tufts are shown for both sides of the air tube.

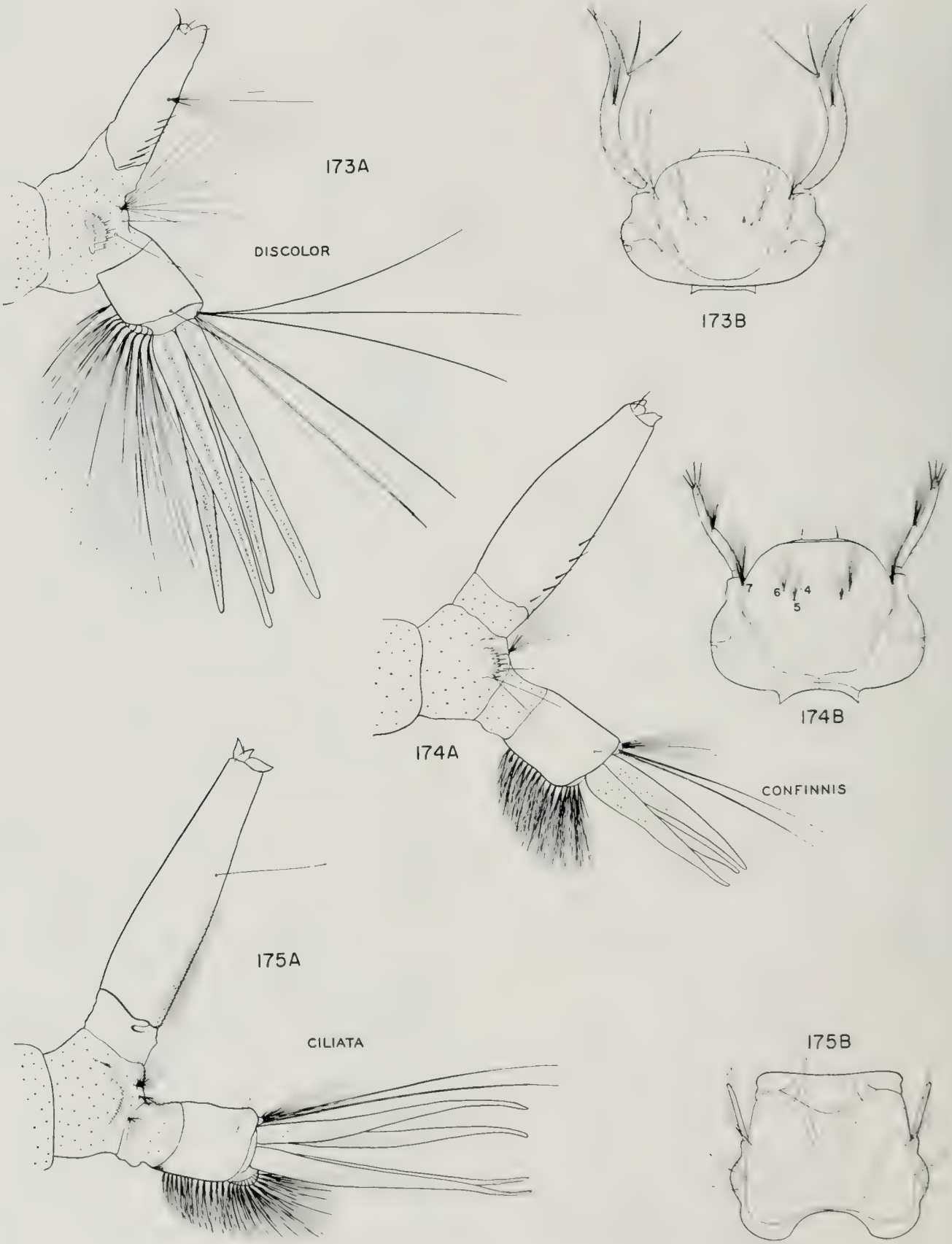


FIG. 173–175.—*Psorophora* larvae: *A*, apex of abdomen, lateral aspect; *B*, dorsum of head.

Air tube long and slender; pecten consisting of only a few sclerous teeth on basal portion of tube (Fig. 171*A*) 3

3. Head hair 5 usually with 7 or more branches; ventral brush usually with 18 or fewer tufts; head hair 7 usually with 9 or more branches.....**minnesotae**

Head hair 5 usually with 5 or fewer branches (Fig. 171*B*); ventral brush usually with 20 or more tufts (Fig. 171*A*); head hair 7 usually with 8 or fewer branches (Fig. 171*B*).....**morsitans**

Key to Species of ORTHOPODOMYIA (Larvae)

Larvae of these two species live only in tree holes.

Head medium to dark brown, body pink; segments 6, 7, and 8 usually with dorsal sclerotized plates, the plate of segment 8 frequently extending ventrad to the ventral margin of the comb (Fig. 127*A*); these sclerotized plates may be entirely absent.....**signifera**

Head pale yellow to white, body white to straw color; segments 6, 7, and 8 without sclerotized plates...**alba**

Key to Species of PSOROPHORA (Larvae)

Larvae of all Illinois species of *Psorophora* live in floodwaters, almost invariably in pools which fill after a rain.

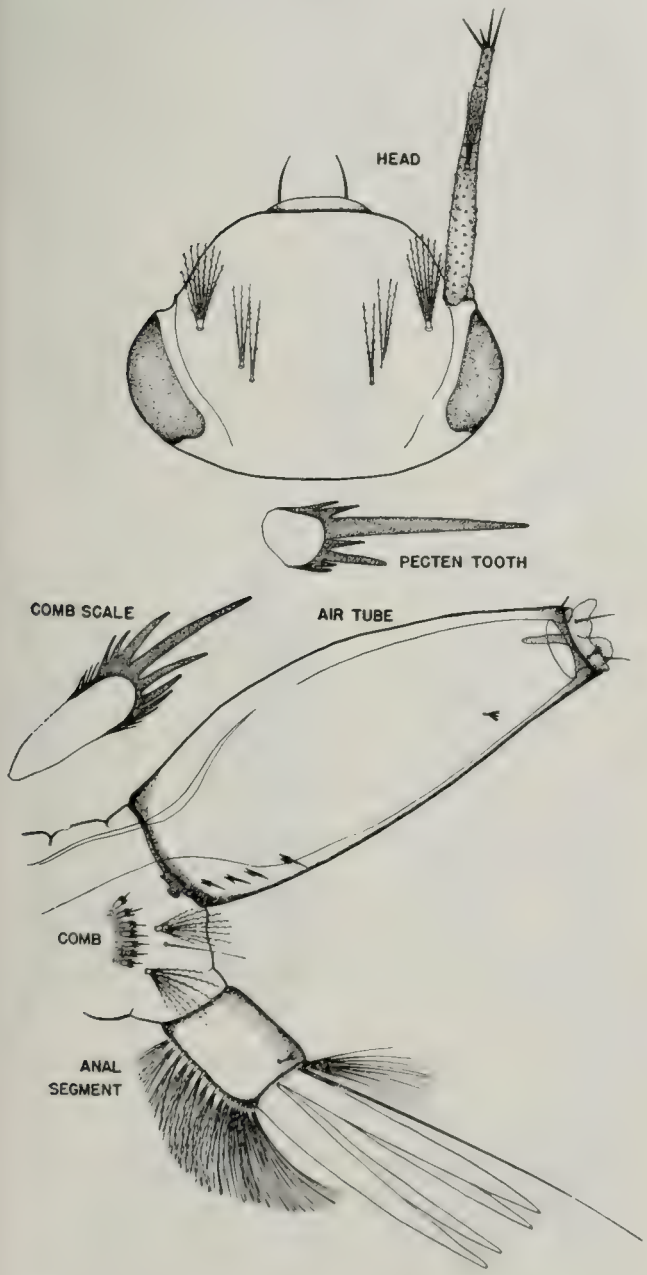


FIG. 176.—*Psorophora horrida*, larval parts. (After Roth 1945.)

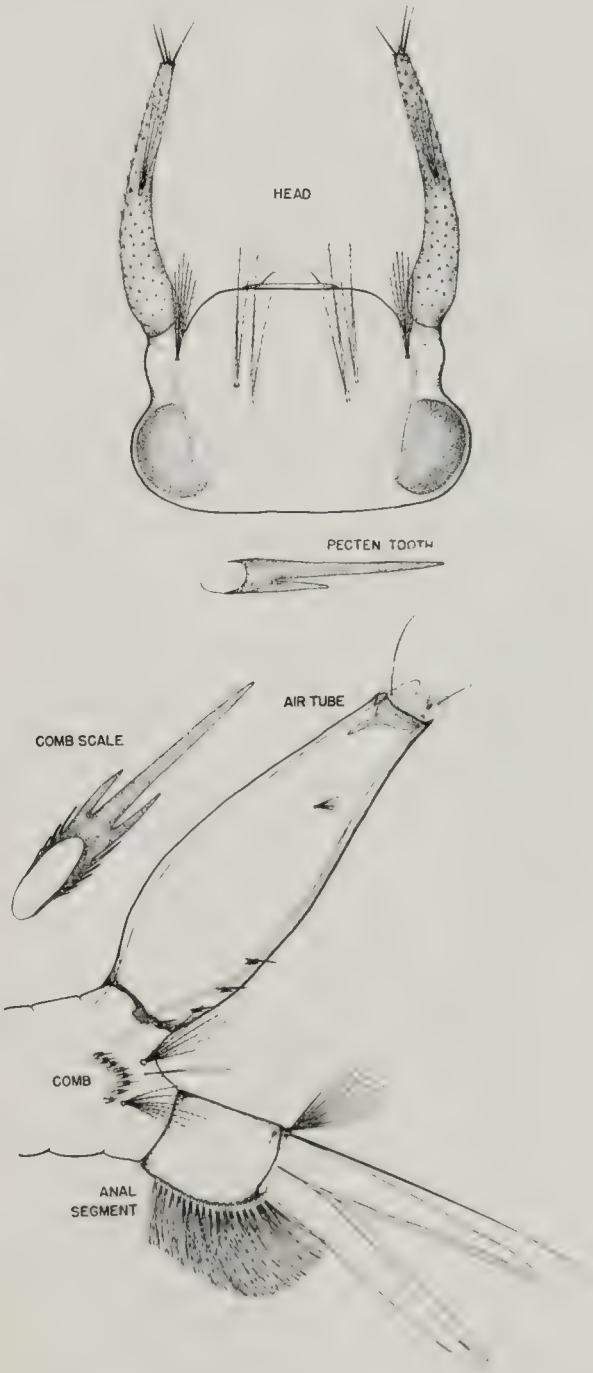


FIG. 177.—*Psorophora longipalpis*, larval parts. (After Roth 1945.)

1. Antenna short, slender, and without definite tufts (Fig. 175*B*); large predacious larvae 2
   Antenna long, stout, and with definite tufts (Fig. 174*B*); small to fairly large larvae which feed on microorganisms 3
2. Lateral hair of anal segment with 2 to 4 branches, separating at base of hair (Fig. 175*A*) ..... **ciliata**
   Lateral hair of anal segment single, or forked some distance from base ..... **howardi**
3. Antenna large and swollen (Fig. 173*B*), air tube small (Fig. 173*A*); larvae greenish when alive ... **discolor**
   Antenna not swollen (Fig. 174*B*), but air tube large and swollen (Fig. 174*B*); larvae not greenish when alive 4
4. Head hairs 5 and 6 multiple (Fig. 174*B*) ... **confinnis**
   Head hair 5 single or double, head hair 6 single to triple (Fig. 176) 5
5. Head hairs 5 and 6 single ..... **cyanescens**
   Head hairs 5 and 6 double or triple (Fig. 176) 6
6. Air tube about 2 times as long as greatest depth ..... **varipes**
   Air tube 2.5 or more times as long as greatest depth (Fig. 176) 7
7. Head hairs 5 and 6 only slightly longer than head hair 7 (Fig. 176) ..... **horrida**
   Head hairs 5 and 6 nearly twice as long as head hair 7 (Fig. 177) 8
8. Head hairs 5 and 6 each having branches of nearly equal length ..... **ferox**
   Head hairs 5 and 6 each having branches of markedly different lengths (Fig. 177) ..... **longipalpis**

KEYS TO CULICIDAE EGGS

Eggs of mosquitoes may be recognizable to genus by their grouping, color, size, shape, and surface markings. To date, diagnostic characters to identify eggs to species are available only for the genera *Aedes* and *Psorophora*. Eggs to be identified should be submerged in water and viewed at magnifications of 75 to 100 diameters in reflected white light above a dull black background.

Key to Genera of CULICIDAE (Eggs)

1. Eggs glued together in the form of floating rafts (Fig. 178) 2
   Eggs found singly 5
2. Surface of egg with many small raised nodules (Fig. 179) ..... **Mansonia perturbans**
   Surface of egg without nodules 3
3. Egg with frothy cap on posterior end (small end) (Fig. 180) ..... **Uranotaenia sapphirina**
   Egg without frothy cap on posterior end 4
4. Egg bluntly rounded at anterior end (Fig. 181) ..... **Culiseta**
   Egg cup-shaped at anterior end (Fig. 182) .... **Culex**
5. Egg strongly biconvex in dorsoventral profile; ratio of diameter to length not greater than 1:2 (Fig. 185) 6
   Egg slender; ratio of diameter to length greater than 1:2 (Fig. 187) 7
6. Egg in rot holes in trees ..... **Toxorhynchites rutilus septentrionalis**
   Egg on soil subject to flooding ..... **Psorophora**
7. Egg in cavities of leaves of pitcher plant (*Sarracenia*) ..... **Wyeomyia smithi**
   Egg elsewhere 8
8. Egg with pair of longitudinal membranous flanges (Fig. 183). Found in rot holes in trees ..... **Orthopodomyia signifera** or **alba**

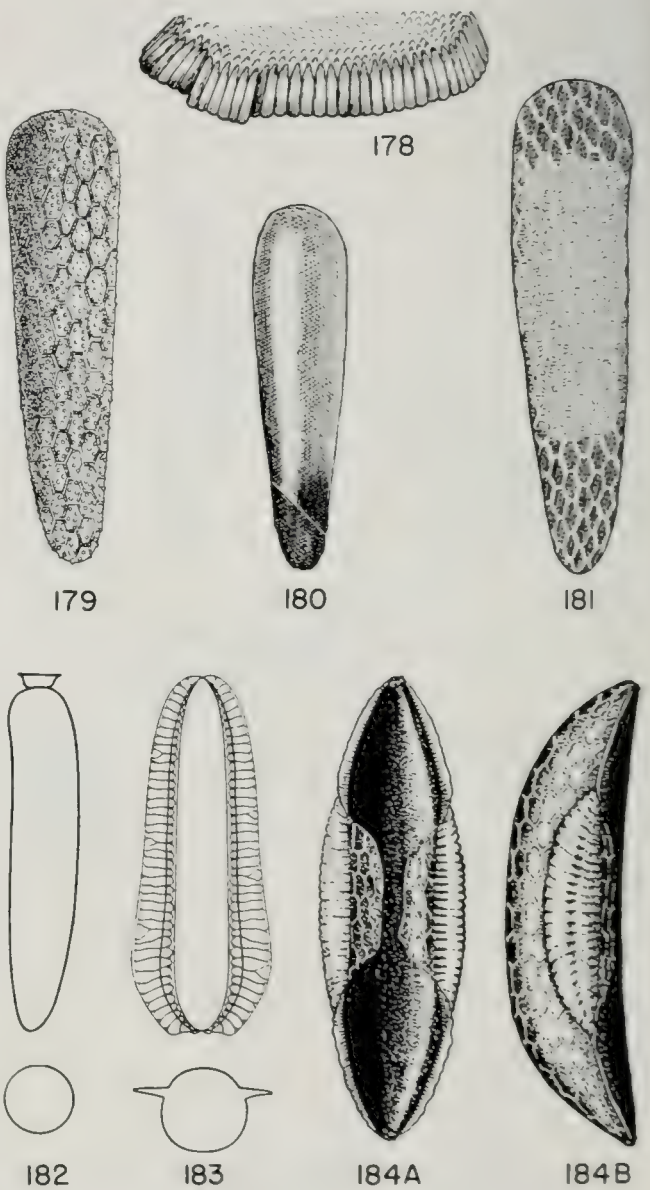
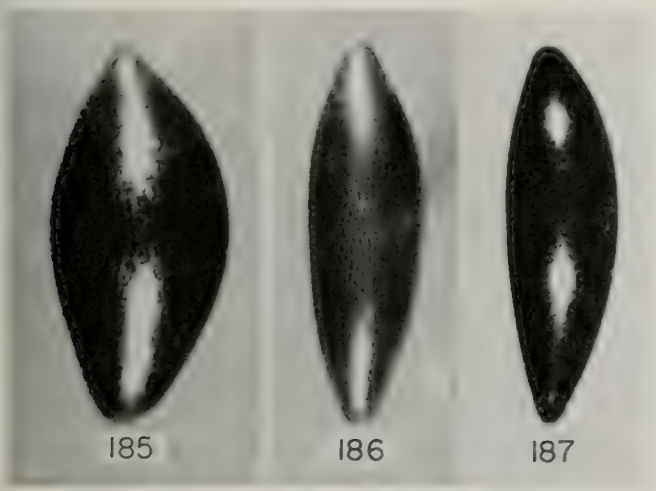


FIG. 178.—Egg raft of *Culex* subgenus *Culex*. (Redrawn from Mitchell 1907.)
FIG. 179.—Egg of *Mansonia*. (Redrawn from Mitchell 1907.)
FIG. 180.—Egg of *Uranotaenia*. (Redrawn from Dyar 1901.)
FIG. 181.—Egg of *Culiseta*. (Redrawn from Mitchell 1907.)
FIG. 182.—Egg of *Culex*. (From Marshall 1938.)
FIG. 183.—Egg of *Orthopodomyia*. (From Marshall 1938.)
FIG. 184.—Egg of *Anopheles*: *A*, lateral aspect; *B*, dorsal aspect. (From Hurlbut 1938.)

Egg without such longitudinal flanges.....9

9. Egg with lateral "floats" (Fig. 184). Found lying on water surface of ground pools and rot holes..... .....Anopheles

Egg without lateral floats.....10



Eggs of mosquitoes. (Ventral side is to the right.)
FIG. 185.—*Psorophora* subgenus *Psorophora.*
FIG. 186.—*Aedes vexans.*
FIG. 187.—*Aedes communis.*

10. Dorsal profile (Fig. 186, 188–207) less arched than ventral profile; eggshell without spicules. Found in domestic containers and on soil.....Aedes

Dorsal profile (Fig. 224–231) more strongly arched than ventral profile; eggshell with spiral rows of stubby anteriorly directed spicules. On soil subject to transient flooding.....Psorophora

Key to Species of AEDES (Eggs)

This key includes only species recorded from Illinois; of these, eggs are not available for *abserratus* and *fulvus pallens,* which are therefore not keyed.

1. Reticulation of eggshell at wide part of egg differing dorsally and ventrally 2

Reticulation of eggshell at wide part of egg alike dorsally and ventrally 3

2. Cells of ventral reticulation at wide part of egg elongated transversely (Fig. 188, 208). In domestic containers of wood or paper.....**aegypti**

Cells of ventral reticulation at wide part of egg not elongated transversely (Fig. 189, 209). In rot holes in trees .....**triseriatus hendersoni**

3. Dorsal profile of egg conspicuously bent near midpoint (Fig. 190) 19

Dorsal profile of egg fusiform or sausage-shaped (Fig. 191) 4

4. Color shiny bronze; reticulation of shell having appearance of longitudinal lines (Fig. 191, 210). In depressions subject to prolonged or frequent flooding .....**vexans**

Color usually black or gray.....5

5. Egg small (0.6–0.7 mm); color shiny black; shell at wide part of egg with cells of reticulation appearing as fine transverse wrinkles (Fig. 192, 211). In woodland depressions in shade of low canopy..... .....**dupreei**

Egg larger; color variable; shell at wide part of egg with cells of reticulation not appearing as transverse wrinkles 6

6. Egg in the form of a long cone widest at anterior end (Fig. 193); color shiny black; reticulations in anterior area of shell strongly raised (Fig. 212). In woodland depressions under shade of low canopy... .....**cinereus**

Egg not conelike; color variable; reticulations of shell absent or not as above 7

7. Eggshell having cells of reticulation faint except in anterior area; each cell not angular but with a lateral budlike expansion on each side (Fig. 214).....8

Eggshell having cells of reticulation angular and without visible lateral budlike expansions.....11

8. Eggshell having lateral buds separated from cell and situated opposite each other near center of cell; most conspicuous on anterior third of shell (Fig. 194, 213). In woodland depressions frequently flooded .....**trivittatus**

Eggshell having lateral buds not separated from cell and not opposite each other (Fig. 214).....9

9. Eggshell having cells of reticulation little longer than wide (Fig. 195, 214). In depressions heavily polluted by industrial wastes containing sulfur..... .....**sollicitans**

Eggshell near anterior end having cells of reticulation two or more times as long as wide.....10

10. Eggshell having lateral buds of reticulation irregularly placed along margin near center of each cell; shape as in Fig. 196.....**mitchellae**

Eggshell having lateral buds of reticulation along margin near each end of cell.....**nigromaculis**

11. Reticulation pebbly (Fig. 215).....12

Reticulation lattice-like (Fig. 216).....13

12. Egg slender (Fig. 197).....**excrucians**

Egg wider (Fig. 198).....**punctor**

13. Eggshell having margins of cells of reticulation knife-like; surface of each cell smooth, or crinkles only at sides (Fig. 216) 14

Eggshell having margins of cells of reticulation flattened; surface of each cell marked by subcells (Fig. 218) 16

14. Eggshell having reticulations in low relief; surface of cells flat (Fig. 199, 216).....**stimulans**

Eggshell having reticulations in high relief.....15

15. Length of egg 0.6–0.8 mm (Fig. 200, 217). In muck soil under canopy of low vegetation such as cattails .....**fitchi**

Length of egg 0.8–1.0 mm (Fig. 201). In firm soil in woodlands .....**grossbecki**

16. Eggshell having subcells of reticulation with angular margins (Fig. 218). From margins of woodland depressions 17

Eggshell having subcells of reticulation circular or nearly so 18

17. Color of eggshell dull bronze; shape and reticulations as in Fig. 202, 218 ..... **canadensis**

Color of eggshell dull black; shape and reticulations as in Fig. 203, 219 ..... **aurifer**

18. Shape and reticulations as in Fig. 204, 220. From clay pits and similar ground pools in industrial areas on soil overlaid with fly ash or calcined mineral waste ..... **dorsalis**

Shape and reticulations as in Fig. 205, 221. From inside tupelo gum or cypress butts ..... **thibaulti**

19. Egg long and narrow (Fig. 190). In woodland depressions, under low canopy ..... **atlanticus tormentor**

Egg short, plump 20

FIG. 188–207.—Eggs of *Aedes*. (Ventral side is to the right.) Eggs to be identified should be submerged in water and viewed at magnifications of 75 to 100 diameters in reflected white light against a dull black background.

20. Venter of egg bent only slightly near midpoint; shape and reticulations as in Fig. 206, 222. From floodplains and woodland depressions.....**sticticus**
Venter of egg bent sharply near midpoint; shape and reticulations as in Fig. 207, 223. From savanna depressions .....**flavescens**

Key to Species of PSOROPHORA (Eggs)

1. Dorsoventral profile of egg strongly biconvex, ratio of diameter to length less than 1:2 (Fig. 224).....2
Dorsal profile of egg only strongly convex; ratio of diameter to length more than 1:2 (Fig. 225).....3
2. Eggshell having disc of each cell of reticulation with

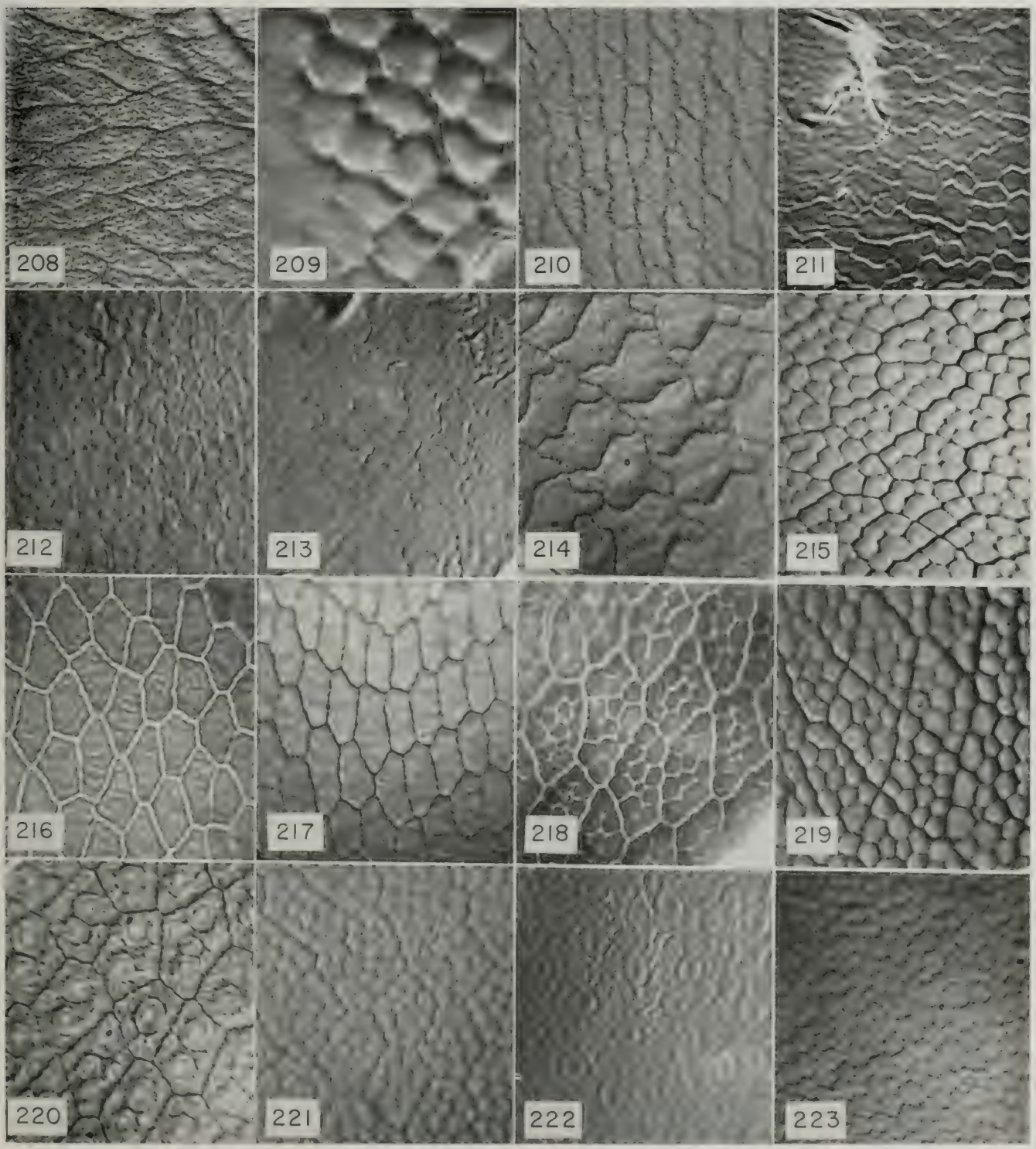


FIG. 208–223.—Highly magnified portions of eggshells of *Aedes:* 208, *aegypti;* 209, *triseriatus;* 210, *vexans;* 211, *dupreei;* 212, *cinereus;* 213, *trivittatus;* 214, *sollicitans;* 215, *excrucians;* 216, *stimulans;* 217, *fitchi;* 218, *canadensis;* 219, *aurifer;* 220, *dorsalis;* 221, *thibaulti;* 222, *sticticus;* 223, *flavescens.*

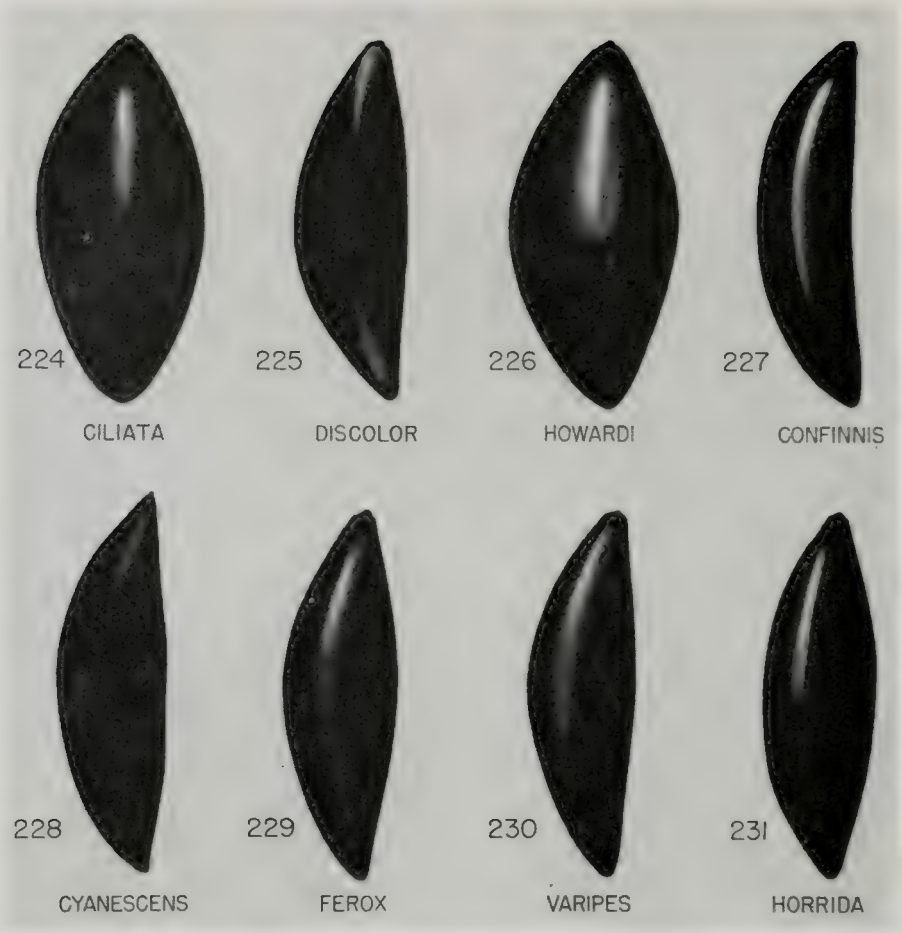


FIG. 224–231.—Eggs of *Psorophora*. (Ventral side is to the right.)

distinct circular spot covering posterior third; shape of egg as in Fig. 224. In savanna and woodland depressions ..... **ciliata**

Eggshell having disc of each cell of reticulation with spot on posterior third not circular; shape of egg as in Fig. 226. In woodland depressions... **howardi**

3. Eggshell without distinct reticulations but studded with distinct elongate spots; egg elongate (Fig. 225). In savanna depressions ..... **discolor**

Eggshell with distinct reticulations, especially noticeable at ends 4

4. Eggshell having margins of cells of reticulation forming sharp ridges with branches radiating onto discs of cells; egg banana-shaped (Fig. 227). In savanna depressions ..... **confinnis**

Eggshell having margins of cells of reticulation not sharply ridged, the reticulations sometimes indistinct in midsection of egg 5

5. Eggshell having margins of cells of reticulation clearly visible over all of intact egg, which is flattened dorsally (Fig. 228). In hoof prints and in shade of low canopy of woodland pastures... **cyanescens**

Eggshell having margins of cells of reticulation more distinct on anterior third than on midsection of intact egg 6

6. Egg (Fig. 229) having shell with reticulations pronounced on anterior one-fifth. In woodland depressions ..... **ferox**

Egg (Fig. 230, 231) having shell with reticulations not pronounced on anterior one-fifth. In woodland depressions ..... **varipes horrida**

MOSQUITOES AND DISEASE

In addition to their role as biters, certain mosquitoes have been indicted as carriers of pathogens that produce diseases in other organisms. Below is a list of mosquitoes that have been incriminated as potential or possible vectors of disease-producing organisms affecting man and domestic animals in Illinois.

These mosquitoes differ widely in effectiveness as vectors. *Anopheles quadrimaculatus* is known to be an effective field vector of malaria. For many other species only laboratory transmission of pathogens has been demonstrated, and for others the association with disease has been limited to the finding of pathogens in the bodies of specimens.

Omitted from the list is *Aedes aegypti*, a known vector of yellow fever; neither the mosquito nor the disease is naturalized in Illinois.

Potential mosquito vectors (indicated by X) of agents pathogenic to man and domestic animals in Illinois.

Species	Pathogens Affecting Man					Pathogens Affecting Domestic Animals		
						Virus		
	Viral Encephalitides			*Plasmodium* (Malaria)	*Francisella* (Tularemia)	Equine Infectious Anemia	Fowl Pox	Rabbit Myxoma
	St. Louis	Eastern	Western					
Culex pipiens	X	X	...	...	...	...	...	...
quinquefasciatus	X	...	...	...	...	...	...	...
restuans	X	X	...	...	...	...	...	...
salinarius	X	X	...	...	...	...	...	...
tarsalis	X	...	X	...	...	...	...	...
territans	...	X	...	...	...	...	...	...
sp.?	...	...	...	...	X	...	X	X
Culiseta sp.	...	...	...	...	X	...	...	...
melanura	X	X	X	...	...	...	...	...
inornata	X	...	X	...	...	...	...	...
Anopheles sp.	...	...	...	...	X	...	...	...
crucians	...	X	X	...	...	...	...	...
quadrimaculatus	...	...	...	X	...	...	...	...
punctipennis	...	X	...	X	...	...	...	...
Psorophora ferox	X	...	...	...	...	X	...	...
Aedes sp.	...	...	...	...	X	...	...	X
vexans	...	X	...	...	...	...	...	...
sticticus	...	X	...	...	...	...	...	...
triseriatus	...	X	...	...	...	...	...	...
nigromaculis	...	...	X	...	...	...	...	...
mitchellae	...	...	X	...	...	...	...	...
Mansonia perturbans	...	X	...	...	...	...	...	...

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